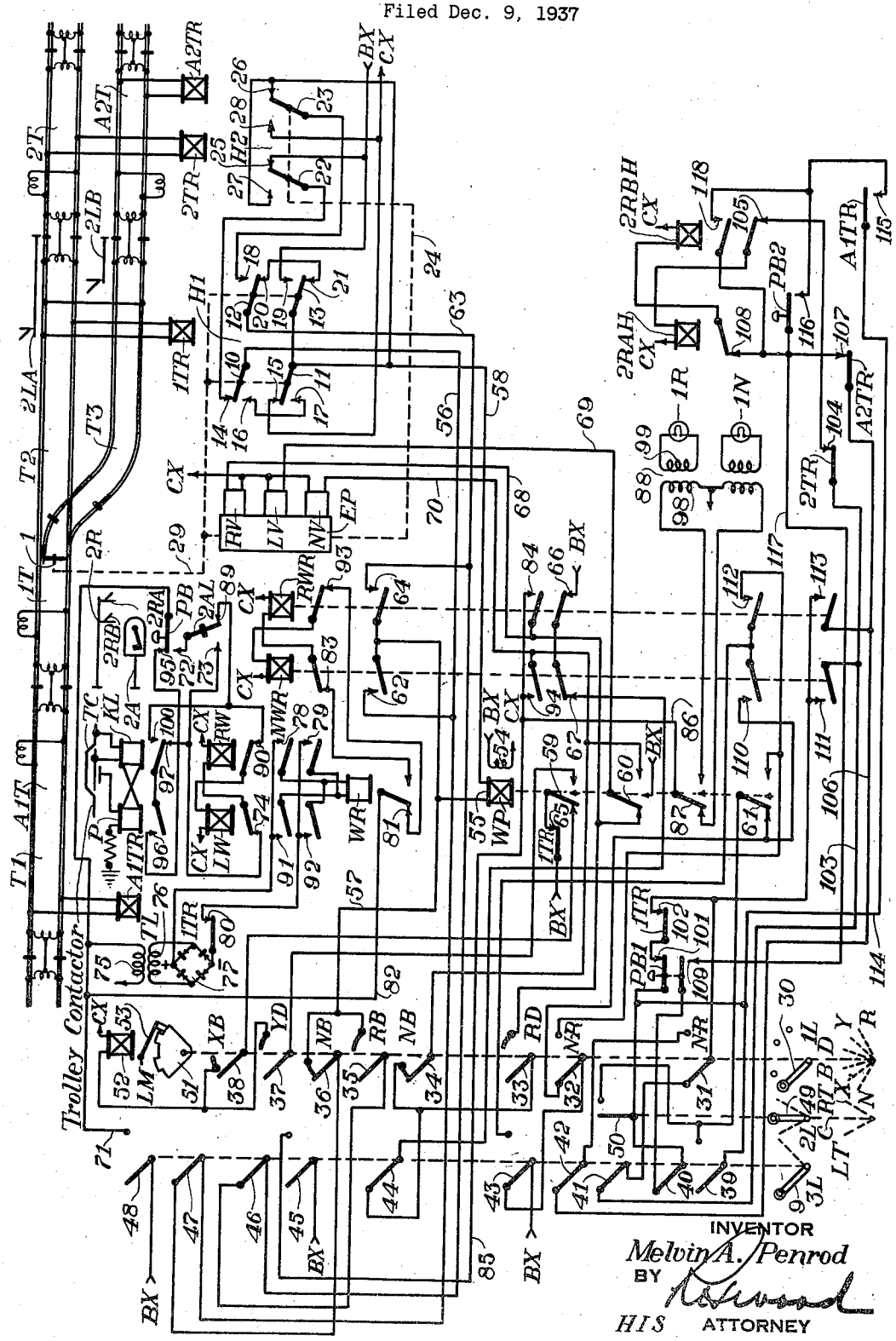
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RAILWAY TRAFFIC CONTROLLING APPARATUS

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RAILWAY TRAFFIC CONTROLLING APPARATUS

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My invention relates to railway traffic controlling apparatus, and has for an object the provision of novel and improved apparatus for safeguarding the operation of a remotely controlled power operated track switch where under certain conditions, local operation is required and, under other conditions, operation of the switch in response to traffic is desired.

I shall describe one form of apparatus embodying my invention, and shall then point out the novel features thereof in claims.

The accompanying drawing is a diagrammatic view illustrating one form of apparatus embodying my invention.

Referring to the drawing, the reference character T1 designates a stretch of single track electrified railway which, at a track switch 1, branches into a double track, the two tracks of which are designated T2 and T3. This stretch of railway is formed into insulated track sections A1T, 1T, 2T and A2T by the usual insulated rail joints, as will be readily understood by an inspection of the drawing, an impedance bond of the usual type being provided at the insulated rail joints for conducting the propulsion current from one track section to the next but substantially blocking the flow of the track circuit signaling current. These track sections are each provided with the usual track circuits, the track relays of which are designated by the reference character R plus a prefix corresponding to the track section.

Signal 2R governs eastbound traffic over the switch 1, the top mechanism 2RA being used when the switch 1 is in its normal position, that is, in the position illustrated in the drawing, for traffic to move to track T2, and the lower mechanism 2RB being used when the switch 1 is moved to its reverse position, that is, to the position opposite that illustrated, for traffic to move to track T3. The signals 2LA and 2LB govern west-bound traffic for the tracks T2 and T3, respectively. These wayside signals may be of any standard type and are shown conventionally.

The track switch 1 is operated by a switch power operated mechanism of any standard type such as, for example, an electropneumatic switch movement shown conventionally as EP. The mechanism EP may, for example, be that disclosed in the United States Letters Patent No. 1,713,169, granted May 14, 1929, to J. P. Coleman for Railway traffic controlling apparatus. It is sufficient for this application to point out that, when the normal magnet valve NV and lock magnet valve LV of the mechanism EP are both energized, the track switch 1 is moved to its normal position; when the reverse magnet valve RV and lock magnet valve LV are energized, the switch 1 is moved to its reverse position; and the mechanism EP is locked except when the lock magnet valve LV is energized.

A controller H1 comprising four movable contact members 10, 11, 12 and 13 is connected with the track switch by any convenient means indicated by the dash line 29. The arrangement of controller H1 is such that contact members 10 and 11 engage the respective contacts 14 and 15 only when the switch is locked in its normal position, and at all other times the contact members 10 and 11 engage the respective contacts 16 and 17. In a similar fashion, the contact members 12 and 13 engage the respective contacts 18 and 19 only when the switch is locked in its reverse position, and at all other times they engage the respective contacts 20 and 21.

A controller H2 comprising two movable contact members 22 and 23 is connected with the mechanism EP, as indicated by a dash line 24. When the mechanism EP is operated to its normal position, the contact members 22 and 23 engage the respective contacts 25 and 26, and, when the mechanism EP is operated to its reverse position the contact members 22 and 23 engage the respective contacts 27 and 28. The controllers H1 and H2 are preferably of standard construction and, in accordance with usual practice, provide, while the track switch is in transit, shunt paths which need not be here described since they form no part of my present invention. The function of controllers H1 and H2 will be taken up later on in the description.

The control of the mechanism EP is accomplished remotely by means of a lever 1L of an interlocking machine and is accomplished locally by means of a manually operable controller 2A located in the vicinity of the track switch and preferably adjacent the wayside signal 2R, and the control is at other times accomplished by traffic governed means which, as here shown, is a trolley contactor TC. Selection between these three different controls is accomplished through the medium of a master lever 3L of the interlocking machine and a push button PB made a part of the controller 2A. These three different control means effect the operation of the mechanism EP through the medium of a normal operating circuit and a reverse operating circuit together with a lock circuit, which circuits will be described hereinafter. When the mechanism

EP is controlled remotely, its two operating circuits and the lock circuit are governed by the lever 1L and a switch indication relay WP, which relay in this instance is an alternating current three-position polarized relay. When the mechanism EP is to be controlled locally, or in response to traffic conditions, the operating and lock circuits of mechanism EP are controlled by control relays NWR and RWR, as well as by the switch indication relay WP.

The lever 1L comprises a handle 30 and a plurality of contact members 31 to 38, inclusive. The diagram appearing immediately below the handle 30 indicates the principal positions which may be occupied by the lever 1L. These positions are: full normal position N, full reverse position R, normal indication position B, reverse indication position D, and two intermediate positions X and Y. The contact members 31 to 38 are operated by the handle 30 to engage stationary contacts to complete contacts at different positions of the lever. The positions at which the various contacts are closed are indicated by reference characters which correspond to the diagram. For example, the contact member 33 is designated by the reference character RD, which means that the contact is closed when the lever is moved to its reverse indication position, to its full reverse position, and to any position between these two. Again, the reference character N—R for contact member 31 means that one contact is closed at the full normal position and another contact is closed at the full reverse position. A lever lock magnet LM is associated with the lever 1L. The lock magnet LM comprises a segment 51 actuated by the handle 30 and a magnet 52 having a locking dog 53 controlled thereby. The locking dog 53 cooperates with the segment 51 for governing the movement of the handle 30 in the well-known manner and need not be here described in detail.

The interlocking machine of which the switch lever 1L forms a part is also provided with a signal lever 2L which comprises a handle 49 and a contact member 50. As indicated by a diagram below the handle 49, the principal positions of lever 2L are: center position C, right position RT and left position LT.

The interlocking machine is also provided with a master lever 3L, which lever comprises a handle 9 and contact members 39 to 48, inclusive. The master lever 3L is movable to a left-hand or normal position, or to a right-hand or reverse position. In the normal position of the master lever 3L, contacts are closed to permit the switch lever 1L and signal lever 2L, with which it would be interlocked in the usual manner, to control the operating circuits of the power operated mechanism EP and the wayside signals, respectively. When the master lever 3L is moved to its reverse position, control of levers 1L and 2L is taken away and contacts are closed to permit the operating circuits to be controlled by the local controller 2A, or by the traffic governed device TC. That is to say, when the switch 1 is to be operated from the tower, in which the interlocking machine is located, the master lever 3L is placed in the normal position, and by means of contacts on the lever the controller 2A and traffic governed device TC are bridged or cut out and the switch lever 1L is made effective to control the operating circuits for the mechanism EP, and the signal lever 2L to control the signals. When the tower is closed, say, during the night, the master lever 3L is placed at its reverse position, which locks all other levers of the interlocking machine. Contacts operated by the lever 3L in the reverse position bridge around the switch lever 1L and signal lever 2L, and control of the switch 1 and in turn of the wayside signals is placed with the controller 2A or the traffic governed device TC.

A push button PB1 is associated with the signal lever 2L for at times modifying its control over the wayside signals, as will appear later. In like manner, a push button PB2 is associated with the controller 2A for at times modifying the control of the wayside signals.

The switch indication relay WP is used to check agreement as to position between the mechanism EP, the track switch 1 and the controlling device. The local winding 54 of relay WP is continuously energized by being connected to the terminals BX and CX of any convenient source of alternating current, not shown. The other winding 55 of relay WP is provided with a normal and a reverse indication circuit governed in part by the controllers H1 and H2. The normal indication circuit can be traced from the BX terminal of the current source over contact 22—25 of controller H2, contact 10—14 of controller H1, wire 56, normal contact of contact member 47 of master lever 3L, the NB contact of contact member 36 of switch lever 1L, wire 57, winding 55, wire 58, contact 11—15 of controller HI and to the CX terminal of the current source. Under this condition, the relative polarity of the current supplied to the windings 54 and 55 of relay WP causes the relay to be energized with its polar contact fingers 59, 60, 61 and 87 moved to their normal or left-hand position, as viewed in the drawing. It is to be noted that the normal indication circuit is completed over the front contact 62 of the control relay NWR when that relay is picked up in a manner to later appear, contact 62 forming a path in shunt with the contacts of levers 1L and 3L. When the mechanism EP and the track switch 1 are moved to their reverse positions in response to operation of the lever 1L, or by one of the other control means in a manner to be later described, a reverse indication circuit is formed. This reverse indication circuit extends from terminal BX over contact 13—19 of controller H1, wire 58, winding 55, wire 57, contact RB of contact member 35, normal contact of contact member 46, wire 63, contact 12—18 of controller H1, contact 23—28 of controller H2 and to terminal CX. This time, the relative polarity of the current supplied to the windings 54 and 55 causes the relay WP to operate its polar contact fingers to their reverse or right-hand position. It is also to be noted that this reverse indication circuit is controlled over front contact 64 of the control relay RWR when that relay is picked up in a manner to later appear, contact 64 forming a path in shunt with the contacts of levers 1L and 3L.

Before going further in the description, it should be pointed out that in certain instances relay contact fingers are shown remote from the relay magnet which operates them. In each such instance, the contact finger is identified by the reference character of the associated relay plus a distinguishing numeral, and the contact finger is illustrated in the position corresponding to the position of the relay.

I shall now take up the description of the operating circuits and the operations by which the mechanism EP and in turn the track switch 1 are governed remotely by the lever 1L, the master lever 3L being placed at its normal position to

select the control of lever 1L. In order to move the switch to its reverse position, the operator would move the switch lever 1L to its reverse indication position, movement of the handle 30 of lever 1L away from its normal position being permitted by the fact that the magnet 52 of the lever lock LM is energized over a circuit controlled by the XB contact of contact member 38 and the normal polar contact 59 of relay WP as well as by a front contact 65 of the track relay 1TR. At the reverse indication position of handle 30, the reverse operating circuit for the reverse magnet valve RV is completed as well as a circuit for the lock magnet valve LV. The reverse operating circuit includes the terminal BX, back contacts 66 and 67 of relays RWR and NWR, respectively, normal contact of contact member 44 of master lever 3L, RD contact of contact member 33 of lever 1L, wire 68, winding of magnet valve RV and to the CX terminal. The lock circuit for lock magnet LV is the same up to wire 68, thence over normal polar contact 60 of relay WP, wire 69, winding of magnet valve LV and to terminal CX. With the reverse magnet valve RV and the lock magnet valve LV both energized, the mechanism EP is operated as required to move the track switch to its reverse position. When the switch 1 is unlocked from its normal position, the previously traced normal indication circuit is opened at contacts 10 and 11 of the controller H1, and relay WP is deenergized. The lock magnet LV remains energized, however, over a circuit completed at the back contact 60 of relay WP. When the switch 1 is locked in its reverse position and the two controllers H1 and H2 are operated to their respective reverse positions, the previously traced reverse indication circuit is closed and relay WP is operated to its reverse position. The magnet 52 of lock magnet LM is now energized by current supplied from terminal BX over front contact 65 of track relay 1TR, reverse polar contact 59 of relay WP, contact YD of contact member 37, winding of magnet 52 and to terminal CX, and magnet 52 on being thus energized lifts its locking dog 53 so that the usual stroke completing means of the interlocking machine is operative to move the switch lever 1L to its full reverse position.

To restore the track switch 1 to its normal position, the operator would move the lever 1L to its normal indication position, movement of the handle 30 away from the full reverse position being permitted due to the fact that magnet 52 is energized over the circuit including contact YD of contact member 37 and the reverse polar contact 59 of relay WP. At the normal indication position of lever 1L, the normal operating circuit for the normal magnet valve NV is completed as well as a lock circuit for the lock magnet valve LV. The normal operating circuit can be traced from terminal BX over back contacts 66 and 67, normal contact of contact member 44, NB contact of contact member 34 of lever 1L, wire 70, winding of normal magnet valve NV and to terminal CX. The lock circuit is the same up to wire 70, thence over reverse polar contact 60 of relay WP, wire 69, winding of magnet valve LV and terminal CX. With both magnet valves NV and LV energized, the mechanism EP is operated as required to move the track switch 1 to its normal position. As soon as the switch is unlocked from its reverse position, the contact members 12 and 13 of controller H1 are operated to open the reverse indication circuit and relay WP is deenergized. While the switch is in transit, the lock magnet LV is retained energized over the back contact 60 of relay WP, the same as before. When the track switch is locked at its normal position and controllers H1 and H2 are operated to their corresponding normal positions, the normal indication circuit of relay WP is completed and relay WP is operated to its normal position where a circuit is closed for magnet 52, and which circuit includes front contact 65, normal polar contact 59, and XB contact of contact member 38. With magnet 52 thus energized, it lifts the locking dog 53 to allow the stroke completing means to move the lever 1L to its full normal position. It follows that, with the master lever 3L placed at its normal position, the switch 1 is operated to its normal and reverse positions in response to movement of lever 1L to its normal and reverse positions.

I shall next take up the circuits and operations by which the operating circuits of mechanism EP are controlled locally by the controller 2A, the master lever 3L being moved to its reverse position to take away the control from the switch lever 1L, and place the control under local controller 2A or under the control of the traffic governed device TC according to the selection made by the push button PB at the controller 2A.

The controller 2A comprises the common spring return push button PB and a control lever 2AL, both mounted in a suitable housing. The push button PB is used to select between lever 2AL and the device TC as to which one is to control the mechanism EP, and the lever 2AL is manually operable to either a right-hand position, that is, the position illustrated in the drawing, or to a left-hand position, that is, the position opposite that illustrated. The lever 2AL is preferably of the type which remains at the position to which it was last moved. When the push button PB is in its normal position, closing the contact 95, the traffice governed device TC is selected, and, when the push button PB is depressed, closing contact 72, the lever 2AL is selected.

The operating circuits of the mechanism EP are governed by the lever 2AL and the device TC through the medium of the normal control relay NWR and the reverse control relay RWR, which relays are themselves controlled by means of two other control relays LW and RW, together with a polar relay WR. Relay WR is preferably a direct current polar relay of the type in which the polar armature, when the relay is deenergized, remains in the position to which it was last moved. To reverse the track switch 1, the operator at the controller 2A would depress the push button PB to select the lever 2AL and would then move the lever 2AL to its left-hand position. Under these circumstances, the control relay RW is picked up and the polar relay WR is energized by current of reverse polarity. The circuit for controlling relay RW includes terminal BX, reverse contact of contact member 48 of master lever 3L, wire 71, contact 72 of push button PB depressed, contact 73 of lever 2AL, back contact 74 of relay LW, winding of relay RW and terminal CX. When the lever 3L is moved to its reverse position to close contact 48, current is supplied to the primary winding 75 of a transformer TL, the secondary winding 76 of which is connected across the input terminals of a full-wave rectifier 77. With relay RW picked up, current flows from the positive output terminal of rectifier 77 over front contact 78 of relay RW, winding of relay WR, front contact 79 of relay RW, front contact 80 of track relay 1TR and to the negative output

terminal of rectifier 77, and relay WR is energized by rectified current of reverse polarity, which causes relay WR to operate its polar armature 81 to the reverse position, that is, to the position opposite that illustrated in the drawing. When the reverse polar contact 81 of relay WR is closed, a circuit is formed from terminal BX over contact member 48 of lever 3L in its reverse position, wires 71 and 82, reverse polar contact 81, back contact 83 of relay NWR, winding of relay RWR and terminal CX, and relay RWR is picked up and remains energized until such time as the polar contact 81 of relay WR is shifted or the master lever 3L is placed back at its normal position.

When control relay RWR is picked up, closing front contact 84, the reverse operating circuit for mechanism EP is completed and the lock circuit for magnet valve LV is closed. The reverse operating circuit involves terminal BX, reverse contact of contact member 45 of lever 3L, wire 85, front contact 84 of relay RWR, wire 68, winding of reverse magnet valve RV and terminal CX. The lock circuit is the same up to wire 68, thence over normal polar contact 60 of relay WP, wire 69, winding of magnet valve LV and terminal CX. With magnet valves RV and LV both energized, the mechanism EP is operated to move the track switch to its reverse position. It is to be noted that while the switch is in transit the indication relay WP is deenergized the same as when lever 1L was the control means, but the lock magnet LV is retained energized over the back contact 60 of relay WP. Also, when the switch is locked in its normal position and the controllers H1 and H2 are operated to the corresponding position, the reverse indication circuit is completed at front contact 64 of relay RWR and relay WP is operated to its reverse position.

To indicate to the operator at the controller 2A that the switch has been moved to its reverse position, an indication lamp 1R is provided, which lamp is preferably mounted adjacent the controller 2A. The circuit means for illuminating the lamp 1R includes a circuit extending from terminal BX over contact member 45 in its reverse position, wire 85, wire 86, reverse polar contact 87 of relay WP, primary winding 98 of a transformer 88 and to the terminal CX, the secondary winding 99 of transformer 88 being connected across the lamp 1R.

In the event the operator at the controller 2A now desires to move the switch 1 to its normal position, he would depress the push button PB to select the lever 2AL and then, while the push button is depressed, move the lever 2AL to its right-hand position, closing contact 89. Under these circumstances, the relay LW is energized and the relay WR is energized with current of normal polarity. The circuit for relay LW involves the terminal BX, contact member 48 in its reverse position, wire 71, contacts 72 and 89, back contact 90 of relay RW, winding of relay LW and terminal CX. With relay LW picked up, current flows from the positive terminal of the rectifier 77 over front contact 91 of relay LW, winding of relay WR, front contact 92 of relay LW, front contact 80 and to the negative terminal of the rectifier 77, and relay WR is energized with current of normal polarity to shift its polar armature 81 to the normal position. This time, a circuit is formed for the control relay NWR, which circuit involves terminal BX, contact member 48 in its reverse position, wires 71 and 82, normal polar contact 81, back contact 93 of relay RWR, winding of relay NWR and terminal CX. Relay NWR, thus energized, is retained so until such time as the polar relay WR is operated or the master lever 3L is restored to its normal position. Selection of the control relay NWR completes a normal operating circuit for the mechanism EP, as well as a lock circuit. The normal operating circuit involves terminal BX, contact member 45 in its reverse position, wire 85, front contact 94 of relay NWR, wire 70, winding of normal magnet valve NV and terminal CX. The lock circuit branches from wire 70 over reverse polar contact 60 of relay WP, wire 69, winding of lock magnet valve LV and terminal CX. With the normal magnet NV and lock magnet LV both energized, the mechanism EP is operated to restore the switch to its normal position. Again, it is to be noted that when the switch is unlocked the indication relay WP is deenergized, the lock circuit for magnet valve LV being completed at the back contact 60 of relay WP; also, when the switch is moved to its normal position and locked in that position so that the controllers H1 and H2 are both moved to their normal positions, the indication relay WP is operated to its normal position, the normal indication circuit being closed at front contact 62 of relay NWR. To indicate the normal position of the switch to the operator at controller 2A, a normal indication lamp 1N is provided and mounted adjacent the controller 2A. When the indication relay WP is operated to its normal position, the lamp 1N is illuminated through the medium of the transformer 88 and the reverse polar contact 87, as will be readily understood by an inspection of the drawing. It follows that, when the master lever 3L is reversed and the push button PB is depressed, the lever 2AL is effective to control the operating circuit of the mechanism EP through the medium of the control relays NWR and RWR, the position of the track switch being indicated to the operator at the controller 2A by means of the lamps 1R and 1N.

I shall next describe the circuits and operations by which the operating circuits for the mechanism EP are governed by the traffic governed device TC in response to traffic approaching the track switch 1, the master control lever 3L being set at its reverse position and the push button PB being in its normal biased position. The traffic governed device TC governs the control relays NWR and RWR for selecting the operating circuits, the relays RWR and NWR being in turn controlled by relays LW and WR, which latter relays are then governed by two relays P and KL associated with the traffic governed device or trolley contactor TC. The device TC is located at a selected point to the left of the signal 2R, and in this instance its construction is that of standard practice for a trolley contactor, so that it is deemed sufficient for this application to point out that when a locomotive passes under the contactor TC with power on the motors both relays P and KL are energized; when a locomotive coasts past the contactor TC, relay P is energized and KL remains deenergized; and when a locomotive passes under the contactor moving to the left as viewed in the drawing the interlocking feature between the relays P and KL prevents relay P from picking up. It is to be understood, of course, that my invention is not limited to a trolley contactor as the traffic governed device, but that the trolley contactor will serve to illustrate the many well-known forms of traffic governed devices.

For example, the traffic governed device may be a light sensitive unit located along the track and effectively influenced by light beams projected from a passing locomotive. Again, such device may be a wayside magnet effected inductively by train carried elements.

Assuming the track switch 1 is in its normal position and that an eastbound train approaches which desires to move to the track T3 so that it is necessary that the switch 1 be set at its reverse position, the engineman would coast under the trolley contactor to cause the relay P to be picked up and the relay KL to remain deenergized. With relay P picked up and relay KL down, a circuit is closed for relay RW which extends from terminal BX over contact member 48 in its reverse position, wire 71, normally closed contact 95 of push button PB, front contact 96 of relay P, back contact 97 of relay KL, back contact 74 of relay LW, winding of relay RW and terminal CX. With relay RW picked up, closing front contacts 78 and 79, current of reverse polarity is supplied to polar relay WR, and that relay is operated to shift its polar armature 81 to the right-hand position. When polar relay WR is operated to its right-hand or reverse position, the control relay RWR is selected in the manner previously described, and that relay on picking up, closing front contact 84, completes the reverse operating circuit for magnet valve RV and the lock circuit for lock magnet valve LV, which circuits are the same as described in connection with the control of lever 2AL. The mechanism EP is now operated to move the track switch 1 to its reverse position where the indication relay WP is operated to its reverse position, completing a circuit at its reverse polar contact 87 for the indication lamp 1R. The lamp 1R would preferably be mounted adjacent the controller 2A so as to be visible not only to the operator at the controller 2A but also visible to an approaching train.

In the event the track switch 1 is at its reverse position and an eastbound train approaches which desires to move to the track T2, the engineman would pass under the trolley contactor TC with power on the motors to cause both relays P and KL to be picked up. Under these circumstances, the relay LW is picked up and the relay WR is energized with current of normal polarity. The circuit for relay LW includes terminal BX, contact 48 in its reverse position, wire 71, contact 95 of push button PB, front contact 96 of relay P, front contact 100 of relay KL, back contact 90, winding of relay LW and terminal CX. Relay LW on picking up, closing front contacts 91 and 92, causes relay WR to be energized by current of normal polarity; relay WR on closing its normal polar contact 81 completes the circuit for control relay NWR; and relay NWR on picking up, closing its front contact 94, completes the normal operating circuit for magnet valve NV and the lock circuit for lock magnet valve LV, the operating circuit and the lock circuit being the same as described in connection with the control by lever 2AL. When the switch is moved and locked in its normal position, the indication relay WP is operated to its normal position and the indication lamp 1N is illuminated to indicate to the approaching train the normal position of the switch.

In the event an eastbound train approaches the switch to pass over the switch in its normal position when the switch is already in its normal position, the engineman would pass under the trolley contactor TC with current on the motors so as to cause both relays P and KL to be picked up. Control relay LW is now energized and relay WR is supplied with current of normal polarity which holds it in its present position, with the result that the control relay NWR remains picked up and the mechanism EP is not operated. Again, in the event the switch 1 is in its reverse position and an eastbound train desiring to move to track T3 approaches, the engineman would coast under the contactor TC so that relay P is picked up and relay KL remains down. This time, the relay RW is picked up to supply current of reverse polarity to the relay WR, and that relay is held in its reverse position so that the control relay RWR remains picked up and there is no movement of the mechanism EP.

I shall now describe the circuit network by which the wayside signal 2R is controlled by the signal lever 2L when the master lever 3L is positioned normally to select lever 1L for controlling the switch 1, and also the circuit network for governing the signal when the lever 3L is reversed to select controller 2A or device TC for controlling the switch 1.

The mechanisms 2RA and 2RB of signal 2R are governed by the signal control relays 2RAH and 2RBH, respectively. The operating circuits controlled by these relays for governing the position of the respective signal mechanisms are not shown for the sake of simplicity since they would be in accordance with standard practice and form no part of my invention. It is to be pointed out, however, that relay 2RAH, when deenergized, causes signal mechanism 2RA to display a stop signal, and, when picked up, it causes the mechanism to display a proceed signal. In like manner, relay 2RBH, when deenergized, causes mechanism 2RB to display a stop signal, and, when energized, causes the mechanism to display a proceed signal. According to standard practice, the mechanism 2RA governs traffic moving to track T2, and mechanism 2RB governs traffic moving to track T3.

When the master lever 3L is normal, movement of lever 2L to its right position RT selects relay 2RAH or 2RBH according to the position of the switch lever 1L and the position of the switch 1 as reflected through the medium of the indication relay WP. With the lever 1L and the switch 1 both normal and signal lever 2L operated to its RT position, a control circuit for relay 2RAH is formed which involves the following elements: terminal BX, contact member 43 in its normal position, the N contact of contact member 32, normal polar contact 61 of relay WP, contact member 50 of lever 2L at its RT position, contact 101 of push button PB1, front contact 102 of track relay 1TR, the N contact of contact member 31, contact member 41 in its normal position, wire 103, front contact 104 of track relay 2TR, back contact 105 of relay 2RBH, winding of relay 2RAH and terminal CX. In the event switch lever 1L and the switch 1 are in their reverse positions and signal lever 2L is operated to its RT position, the relay 2RBH is selected over a circuit which involves the following elements: terminal BX, contact member 43, the R contact of contact member 32, reverse polar contact 61 of relay WP, contact member 50 in its RT position, contact 101, front contact 102, the R contact of contact member 31, contact member 42 in its normal position, wire 106, front contact 107 of track relay A2TR, back contact

108 of relay 2RAH, winding of relay 2RBH and terminal CX.

The push button PB1 modifies the control of lever 2L and provides the usual call-on circuit for relay 2RBH, which circuit is effective to pick up that relay at such time as there is a failure of a track circuit or some other unusual traffic condition. This circuit includes terminal BX, contact member 43, either the N or R contact of contact member 32, and the corresponding normal or reverse polar contact 61, contact member 50, normal position of contact member 40, contact 109 of push button PB1 depressed, wire 117, back contact 108 and winding of relay 2RBH to the CX terminal.

Taking up next the circuits for controlling the relays 2RAH and 2RBH by the control relays NWR and RWR when the master lever 3L is operated to its reverse position to select control of switch 1 by controller 2A or device TC, the circuit for relay 2RAH involves terminal BX, contact member 43 in its reverse position, front contact 110 of relay NWR, normal polar contact 61, contact member 39 in its reverse position, contacts 101 and 102, front contact 111 of relay NWR, wire 103, front contact 104, back contact 105, winding of relay 2RAH and terminal CX. In the event the reverse control relay RWR is selected, then a circuit is provided for relay 2RBH which involves terminal BX, contact member 43 in its reverse position, front contact 112 of relay RWR, reverse polar contact 61 of relay WP, reverse position of contact member 39, contacts 101 and 102, front contact 113 of relay RWA, wire 106, front contact 107, back contact 108, winding of relay 2RBH and terminal CX. To provide the relay 2RBH with a call-on circuit, when the master lever 3L has been reversed to select control of switch 1 by the controller 2A or device TC, the push button PB2 is provided and would preferably be located at the controller 2A. This call-on circuit for relay 2RBH involves the same elements described above for the circuit of relay 2RBH up to the contact member 39 in its reverse position, thence the circuit extends over wire 114, back contact 115 of track relay A1TR, contact 116 of push button PB2 depressed, back contact 108, winding of 2RBH and to the terminal CX. It is to be noted that a front contact 118 of relay 2RBH completes a shunt around the push button PB2 so that the relay 2RBH would be retained energized subsequent to the release of the push button.

The control circuits for the wayside signals 2LA and 2LB would be in accordance with standard practice and are not shown in order to not unduly complicate the drawing, since they are not required to illustrate my invention.

Although I have herein shown and described only one form of apparatus embodying my 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 my invention.

Having thus described my invention, what I claim is:

1. In combination with a railway track switch provided with a power operated mechanism for moving the switch to its normal and reverse positions, a normal and a reverse operating circuit for said mechanism, a first manually operated device located remote from the switch, a second manually operated device located along the track adjacent the switch, a third device including trackway apparatus located at a point in advance of the switch effectively influenced by train carried elements, said three devices each operative to control said operating circuits for moving the switch, a master selector operative to select said first device to control the switch or to take away the control of the first device and place the control under either the second or third device, and another selector located adjacent the switch operative to select between the second and third devices.

2. In combination with a railway track switch provided with a power operated mechanism for moving the switch to its normal and reverse positions, a normal and a reverse operating circuit for said mechanism, a switch lever located at a remote tower, a manually operable controller located adjacent said track switch, trackway means disposed along the track to one side of said switch operable by an operator on a train, a master control lever located at the tower having a normal and a reverse position, a push button associated with said controller, contacts closed at the normal position of the master lever to associate the switch lever with said operating circuits for remotely controlling the switch, contacts closed at the reverse position of the master lever and said push button depressed to associate said controller with the operating circuits for locally controlling the switch, and contacts closed at the reverse position of the master lever and the push button released to associate said trackway means with said operating circuits for controlling the switch from an approaching train.

3. In combination with a railway track switch provided with a power operated mechanism for moving the switch to its normal and reverse positions, a normal and a reverse operating circuit for said mechanism, a switch lever located at a remote tower, a manually operable controller located adjacent said track switch, trackway means disposed along the track to one side of said switch operable by an operator on a train, a master selector having a first and a second position associated with said switch lever, another selector having a first and a second position associated with said controller, contacts closed only at the first position of the master selector to associate the switch lever with said operating circuits for control of the switch by an operator at the tower, contacts closed only at the second position of the master selector and the second position of said other selector to associate the controller with said operating circuits for control of the switch by an operator at the switch, and contacts closed only at the second position of the master selector and the first position of said other selector to associate said trackway means with said operating circuits for control of the switch by an operator on a train.

4. In combination with a railway track switch provided with a power operated mechanism for moving the switch to its normal and reverse positions, a normal and a reverse operating circuit for said mechanism, a switch lever located at a remote tower, a manually operable controller located adjacent said track switch, trackway means disposed along the track to one side of said switch operable by an operator on a train, a master selector having a first and a second position associated with said switch lever, another selector having a first and a second position associated with said controller, contacts closed only at the first position of the master selector to associate the switch lever with said operating circuits for control of the switch by an operator

at the tower, contacts closed only at the second position of the master selector and the second position of said other selector to associate the controller with said operating circuits for control of the switch by an operator at the switch, contacts closed only at the second position of the master selector and the first position of said other selector to associate said trackway means with said operating circuits for control of the switch by an operator on a train, indication means associated with said switch lever to indicate agreement as to position between the mechanism and the switch to the operator at the tower, and other indication means associated with said controller by the second position of the master selector to indicate agreement as to position between the mechanism and the switch to the operator at the switch and to the operator on the train.

5. In combination with a railway track switch provided with a power operated mechanism for moving the switch to its normal and reverse positions, a normal and a reverse operating circuit for said mechanism, a remote manually operable lever having normal and reverse contacts for respectively closing said normal and reverse operating circuits, a normal and a reverse control relay having front contacts for respectively closing said normal and reverse operating circuits, a local manually operable lever having normal and reverse contacts for governing respectively said normal and reverse control relays, a master manually operable lever having a normal position and a reverse position, means controlled by the normal position of said master lever to render said remote lever effective to govern said operating circuits and said local lever ineffective to govern said relays, and other means controlled by the reverse position of said master lever to render said remote lever ineffective to govern said circuits and said local lever effective to govern said relays.

6. In combination with a railway track switch provided with a power operated mechanism for moving the switch to its normal and reverse positions, a normal and a reverse operating circuit for said mechanism, a remote manually operable lever having normal and reverse contacts for respectively closing said normal and reverse operating circuits, a normal and a reverse control relay having front contacts for respectively closing said normal and reverse operating circuits, a local manually operable lever having normal and reverse contacts for governing respectively said normal and reverse control relays, trackway apparatus disposed at a point to one side of the switch operable to either a first or a second position when a train passes said point, means controlled by the first and second positions of said apparatus for governing respectively said normal and reverse relays, a first selector having a first and a second position for selecting either said local lever or said trackway apparatus for governing said relays, a master selector having a normal and a reverse position, means controlled by the normal position of the master selector to render said remote lever effective to govern said operating circuits and said first selector ineffective to select either the local lever or the trackway apparatus, and means controlled by the reverse position of the master selector to render said remote lever ineffective to govern the operating circuits and the first selector effective to select either the local lever or the trackway apparatus to govern said relays.

7. In combination with a railway track switch provided with a power operated mechanism for moving the switch to its normal and reverse positions, a normal and a reverse operating circuit for said mechanism, a switch lever at the switch having a normal and a reverse position for selectively controlling said operating circuits, trackway means disposed to one side of the switch operable to a first or a second position by an operator on a passing train, circuit means governed by the first and second positions of the trackway means for selectively controlling said operating circuits, a selector having a first and a second position, contacts closed at the first position of said selector to associate the switch lever with said operating circuits, and contacts closed at the second position of said selector to associate the trackway means with said operating circuits.

8. In combination with a railway track switch provided with a power operated mechanism for moving the switch to its normal and reverse positions, trackway means disposed along the track to one side of the switch selectively responsive to a train passing said means under power and a train coasting past the means, a polar relay, means governed by the trackway means to supply an impulse of current of normal polarity to the polar relay when a train passes under power and to supply an impulse of current of reverse polarity to the relay when a train coasts by, and means controlled by said polar relay for governing said mechanism.

9. In combination with a railway track switch provided with a power operated mechanism for moving the switch to its normal and reverse positions, trackway means disposed along the track to one side of the switch selectively responsive to a train passing said means under power and a train coasting past the means, a manually operable lever located along the track having a first and a second position, a polar relay, means governed by the trackway means to supply to the relay an impulse of current of normal polarity or of reverse polarity according to a train passing under power or coasting by, other means governed by said lever to supply to the relay current of normal polarity or of reverse polarity according to the lever placed at its first or second position, means controlled by said polar relay for selectively governing said mechanism, and a manually operable selector for selecting either the trackway means or the lever for control of the relay.

10. In combination with a railway track switch provided with a power operated mechanism for moving the switch to its normal and reverse positions, trackway means disposed along the track to one side of the switch selectively responsive to a train passing said means under power and a train coasting past the means, a manually operable lever located along the track having a first and a second position, a polar relay, means governed by the trackway means to supply to the relay an impulse of current of normal polarity or of reverse polarity according to a train passing under power or coasting by, other means governed by said lever to supply to the relay current of normal polarity or of reverse polarity according to the lever placed at its first or second position, means controlled by said polar relay for selectively governing said mechanism, a manually operable selector for selecting either the trackway means or the lever for control of the relay, and indication means governed by said switch and said mechanism to indicate at said

lever and to an approaching train agreement as to position between the switch and the mechanism.

11. In combination with a railway track switch provided with a power operated mechanism for moving the switch to its normal and reverse positions, trackway means disposed along the track to one side of the switch selectively responsive to a train passing said means under power and a train coasting past the means, a manually operable lever located along the track having a first and a second position, a polar relay, means governed by the trackway means to supply to the relay an impulse of current of normal polarity or of reverse polarity according to a train passing under power or coasting by, other means governed by said lever to supply to the relay current of normal polarity or of reverse polarity according to the lever placed at its first or second position, means controlled by said polar relay for selectively governing said mechanism, a manually operable selector for selecting either the trackway means or the lever for control of the relay, indication means governed by said switch and said mechanism to indicate at said lever and to an approaching train agreement as to position between the switch and the mechanism, another manually operable lever located at a remote tower operative to govern said mechanism, and another manually operable selector at the tower operative to render the first mentioned selector ineffective and to select the tower lever for governing the mechanism.

12. In combination with a railway track switch provided with a power operated mechanism for moving the switch to its normal and reverse positions and a wayside signal for governing traffic over the switch, a normal and a reverse control relay, trackway apparatus disposed in advance of the signal operable to a first or a second position by an operator on a passing train, a manually operable lever located adjacent the switch having a first and a second position, circuit means governed either by the first position of the trackway apparatus or the first position of the lever to operate said normal relay, other circuit means governed either by the second position of the trackway apparatus or the second position of the lever to operate said reverse relay, operating circuits selectively controlled by said relays for operating said mechanism, other operating circuits selectively controlled by the relays and said switch for operating the signal, and a selector for selecting either the trackway apparatus or the lever for operating said relays.

13. In combination with a railway track switch provided with a power operated mechanism for moving the switch to its normal and reverse positions and a wayside signal for governing traffic over the switch, trackway apparatus disposed in advance of the signal operable to a first or a second position by an operator on a passing train, a manually operable controller located adjacent the switch having a first and a second position, a switch lever having a first and a second position located at a tower remote from the switch, a normal and a reverse operating circuit for said mechanism, means governed by the first position of the trackway apparatus or the first position of the controller or the first position of the lever to close said normal operating circuit, means governed by the second position of the trackway apparatus or the second position of the controller or the second position of the lever to close said reverse operating circuit, a signal lever located at the tower, control circuit means governed by said signal lever or said trackway apparatus or said controller for governing the signal, a master lever at the tower operative to a first position to place the control of the switch and signal under said switch and signal levers and operative to a second position to place the control of the switch and signal under either said trackway apparatus or said controller, and means located at the controller to select between said trackway apparatus and said controller.

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