

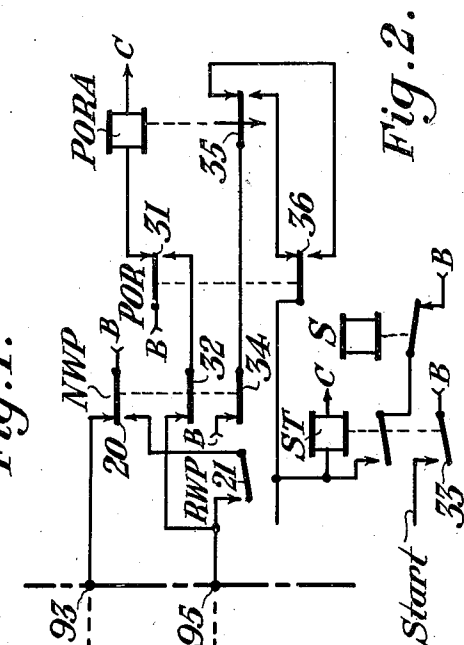
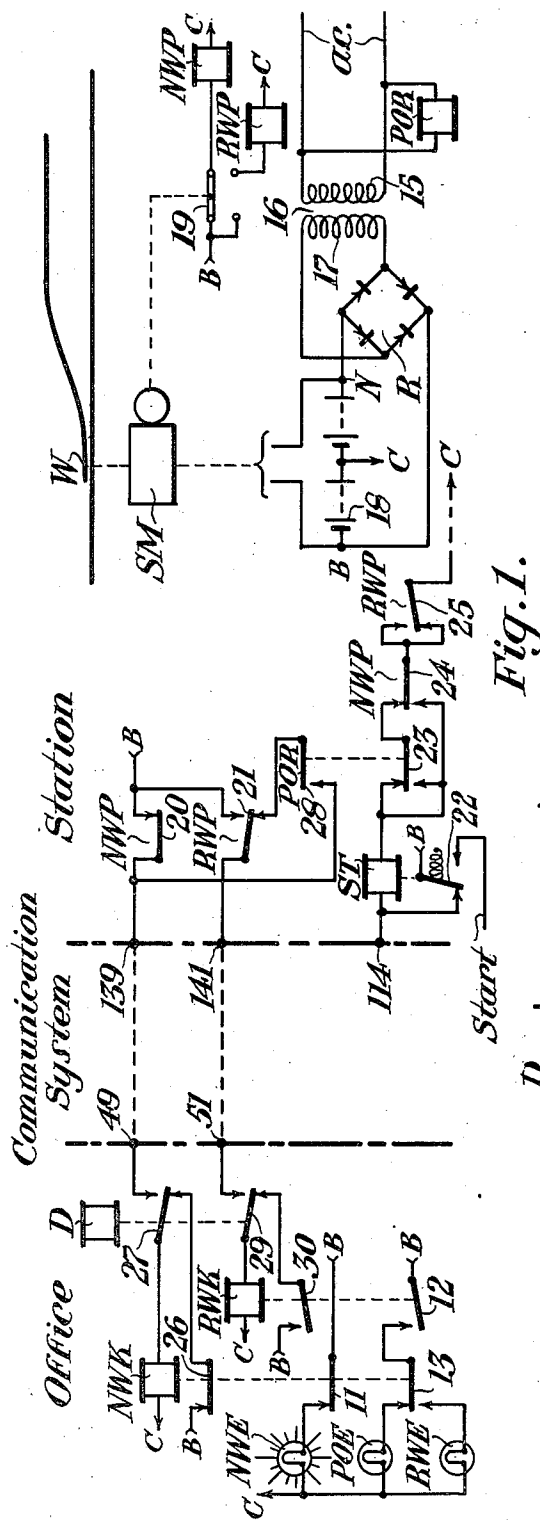
Feb. 1, 1949.

H. S. YOUNG

2,460,337

REMOTE CONTROL SYSTEM

Filed June 20, 1946



INVENTOR.
Henry S. Young.
BY *L. Wood*
HIS ATTORNEY.

UNITED STATES PATENT OFFICE

2,460,337

REMOTE-CONTROL SYSTEM

Henry S. Young, Wilkinsburg, Pa., assignor to
The Union Switch & Signal Company, Swiss-
vale, Pa., a corporation of Pennsylvania

Application June 20, 1946, Serial No. 678,023

9 Claims. (Cl. 246—3)

1

My invention relates to remote control systems and more particularly to centralized traffic control systems for railroads, in which traffic governing devices located along a trackway are governed from a central office and the conditions of the devices and associated apparatus are indicated at such office.

In systems of the type described the office is linked with the traffic governing devices along the trackway by means of a communication system which may be either of the direct wire type, or of the code type, such as the system shown in Letters Patent of the United States No. 2,229,249, granted to L. V. Lewis on January 21, 1941, or that comprising a modification of the Lewis patent shown in an application for Letters Patent of the United States Serial No. 496,907, filed July 31, 1943, by A. P. Jackel for Remote control systems, which has since matured into U. S. Patent No. 2,411,375, granted Nov. 19, 1946 and assigned to the assignee of the present invention. The system of the Jackel patent is illustrated and described in Manual No. 506-A published October 1943 by the Union Switch & Signal Company.

Centralized traffic control systems usually are arranged so that two indication channels are used to provide indications relating to three different conditions of a movable device, and in systems using a communication system of the code type two steps in the indication code are used as such channels. For example, a track switch is a three-position device having a normal, a reverse and an intermediate position. The position of a switch is indicated over two channels arranged in such manner that one channel indicates whether or not the switch is locked in its normal position, and the other channel indicates whether or not the switch is locked in its reverse position. Thus when the switch is locked in either its normal or its reverse position it provides one character for the code step which indicates that the switch is locked in the corresponding position, and provides a different character for the other code step, thereby to provide an indication of either one of two (normal and reverse) positions of the switch. When the switch is unlocked by the switch machine, as when the switch points are in transit between extreme positions, the code intervals of the two switch indication steps both have the different character mentioned, to indicate the third or transit condition of the switch. The two steps are capable of indicating a fourth condition if both have the one character referred to, but the switch obviously is not adapted to afford a control

2

which establishes this character for both steps, and the full capacity of the code ordinarily is not utilized.

It has been proposed heretofore to make use of this fourth code condition (in which both steps have the one code character) to indicate a two-position device, as shown, for example, in the copending applications for Letters Patent of the United States, Serial No. 649,072, filed February 20, 1946 by Ira F. Cadman and Serial No. 665,018, filed April 26, 1946 by Joseph A. Quinlan, both of which applications are assigned to the assignee of the present application. The present case is directed to subject matter similar to that of the copending applications mentioned above.

It is an object of my invention to utilize the fourth condition provided by the two steps of an indication code assigned to indicate a track switch. This fourth condition is employed to provide information of the availability of power in the primary source for operating the switch. The fourth indication is provided when the switch occupies its normal position, and is effective to permit both the position of the switch and condition of the source to be indicated simultaneously, thus providing full information to the operator of the condition of the apparatus at the switch.

Another object of my invention is to provide means for utilizing the two indication channels of a centralized traffic control system which indicate three conditions of a movable device, to provide an additional indication of the operation of a two-position device which otherwise would require the provision of an additional code step.

A specific object of my invention is to provide means for enabling apparatus provided for indicating the condition of a remotely controlled power operated track switch to indicate also the condition of the primary power supply for operating the switch. Other features of my invention will be pointed out in detail in the accompanying specification.

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

In the accompanying drawings, Fig. 1 is a diagrammatic view illustrating one form of apparatus embodying my invention. Fig. 2 is a diagrammatic view of a modified form of the apparatus represented in Fig. 1, and also embodying my invention. In each of the two views, similar reference characters refer to corresponding parts.

Referring to Fig. 1, a centralized traffic control

system is represented as comprising apparatus at an office and at a station, and a communication system linking the office with the station.

The communication system, which may be of either the direct wire or the code system, is conventionally represented in the drawing as being a code system of the type illustrated in the previously mentioned Jackel patent and Manual 506-A. For the purposes of explaining the present invention it is sufficient to state that the communication system provides a number of control channels (not represented in the drawing), and a number of indication channels some of which are represented in the drawing by dash lines, with the wires of each channel designated by reference characters which are the same as those used to designate corresponding wires in the Jackel patent. For example, the indication channels 49-139 and 51-141 represent individual code steps of an indication code, and the system functions in the manner explained in the Jackel patent so that if one terminal B of a suitable local source of current at the station is connected to wire 139 when an indication code is transmitted, the code will include a step of a particular character corresponding to the energization of channel 49-139, to cause terminal B of a source at the office to be applied to terminal 49. If terminal B is not connected to line 139 when an indication code is transmitted, then the code will contain a step of a different character corresponding to the deenergization of channel 49-139 and terminal B at the office is not connected to wire 49. Similarly, if terminal B at the station is connected to wire 141 when an indication code is transmitted, the code will include a step of the particular character corresponding to the energization of channel 51-141 to apply terminal B at the office to wire 51, while if terminal B is disconnected from wire 141 when a code is transmitted, a step of the different character is transmitted and terminal B is then not connected to wire 51.

The apparatus at the office, as indicated in the drawing, includes an office delivery relay D which corresponds to the office delivery relay D of the Jackel patent and which is picked up at the office at the end of a complete indication code received from the station, as is explained in the Jackel patent, and a normal indication relay NWK and a reverse indication relay RWK selectively picked up according as energy is applied to terminal 49 or 51 at the office when the office delivery relay D is picked up. After relay NWK or RWK is picked up, it is held energized over a stick circuit including its own front contact and a back contact of relay D, when that relay releases at the end of the indication code. To visually indicate the position of a track switch at the station, the office is provided with two indication lamps NWE and RWE. Lamp NWE is energized over front contact 11 of relay NWK, while lamp RWE is energized over a circuit including front contact 12 of relay RWK and back contact 13 of relay NWK, the arrangement being such that one lamp may be energized whenever its associated relay is picked up regardless of the position of the other relay, but the other lamp may be energized only when its associated relay is picked up and the other relay is released. An additional indication lamp POE provided at the office when lighted indicates loss of the primary power supply at the station. Lamp POE is controlled over a circuit including

in series front contacts 13 and 12 of relays NWK and RWK, and is therefore energized when both relays NWK and RWK are energized.

The apparatus at the station includes a track switch W, a power switch operating mechanism SM operatively connected with the switch for operating it between its two extreme (normal and reverse) positions, and a primary source of power indicated conventionally in the drawing by the reference characters *ac*, connected to a primary winding 15 of a transformer 16 having its secondary winding 17 connected to the input terminals of a rectifier R. The output terminals of the rectifier are connected across end terminals B and N of a battery 18, and normally supply rectified current to the battery to maintain it fully charged. Connections from terminals B and N of battery 18 provide energy for operating the motor of switch machine SM for switch W, and connections to terminals B and C of battery 18 provide energy for operating other apparatus at the switch location. The supply of energy from battery 18 to the motor of switch machine SM is governed by suitable apparatus, not shown but which may correspond to that shown in the Jackel patent, controlled by the communication system so as to establish control of the operation of switch W from the office. Switch repeating relays NWP and RWP are provided at the station to indicate the position of track switch W. These relays are selectively energized over a contact 19 operated by switch mechanism SM, provided switch W is locked in its normal or reverse position, respectively. The relays NWP and RWP govern the transmission of switch indication codes from the station to the office in the customary manner. That is to say, relay NWP when picked up prepares a circuit for connecting terminal B at front contact 20 of relay NWP to wire 139; while relay RWP when picked up prepares a circuit for connecting terminal B at front contact 21 of relay RWP to wire 141. The connection of terminal B to wire 139 or 141, as the case may be, over the circuits just mentioned may include other contacts operated by apparatus shown in the Jackel patent but not shown herein because they are not necessary to an understanding of the present invention.

A power-off relay POR is connected across primary winding 15 of transformer 16 for indicating the continuity of power from source *ac* and is held energized as long as power is available from the alternating current source. Relay POR governs, in a manner to be explained hereinafter, the transmission of an indication controlling the power-off lamp POE at the office. The provision of this indication is of particular advantage in connection with a power operated track switch, because in the event of a power failure it enables the operator to call the maintainer promptly, usually over the communication system, and thereby facilitate the correction of the fault and restoration of the power supply before switch battery 18 is fully discharged.

The indication codes are initiated at the station in the manner explained in the Jackel patent by the release of a normally energized station starting relay ST corresponding to the similarly designated relay in the application. Relay ST is normally held energized over a stick circuit extending from terminal B at contact 22 of relay ST through the winding of relay ST and then over a front or a back contact of each of the

several indicating relays, in series, to terminal C; the circuit as illustrated including front contact 23 of relay POR, front contact 24 of relay NWP, and back contact 25 of relay RWP, but it is to be understood that this circuit includes additional contacts of other indication relays, such as shown in the Jackel patent.

The condition of the apparatus, as shown, is that obtaining when switch W occupies its normal position and power is available from source *ac* at the station. At the office, normal indication relay NWK is energized over its stick circuit extending from terminal B at its front contact 26 over back contact 27 of relay D and the winding of relay NWK to terminal C; and normal switch indication lamp NWE is energized over its circuit including front contact 11 of relay NWK.

At the station, switch W is in its normal position; normal switch repeating relay NWP is energized over contact 19 operated by switch mechanism SM, in its normal position; and relays POR and ST are energized.

The apparatus at the station operates in the usual manner to reflect a change in position of track switch W. For example, if the switch machine is controlled over the communication system to cause switch W to operate from its normal to its reverse position, the initial movement of the mechanism as it unlocks the switch points to permit them to be moved to the reverse position, results in opening contact 19 of the mechanism in the circuit of relay NWP whereupon that relay releases. Front contact 24 of relay NWP opens to interrupt the previously traced stick circuit of starting relay ST. Relay ST is a quick acting relay and releases prior to the closing of back contact 24 of relay NWP to prepare another circuit for relay ST, and the release of relay ST causes its contact 22 to shift from its energized or left-hand position (as viewed in the drawing) to its deenergized or right-hand position where it establishes a circuit designated "start" in the drawing to establish the channels 49-139 and 51-141 and initiate the transmission of an indication code to the office in the manner explained in the Jackel patent. During the transmission of this code both relays NWP and RWP are in their released positions so that terminal B is applied to neither wire 139 or 141. As a result, both switch indication channels in this code are deenergized and when relay D picks up at the office, the stick circuit of relay NWK is interrupted so that relay NWK releases to open its front contact 11 and deenergize lamp NWE. With both lamps NWE and RWE dark at the office, an indication is provided of the unlocked or transit condition of the switch. At the end of the complete indication code initiated by the release of relay NWP, relay ST becomes energized in the manner explained in the Jackel patent by energy applied in a pick-up circuit to wire 114, and relay ST thereupon picks up to close its contact 22 to complete its stick circuit which holds that relay energized after its pick-up circuit becomes interrupted. The stick circuit of relay ST now includes back contact 24 of relay NWP and back contact 25 of relay RWP, but does not include either the front or back contact 23 of relay POR. In other words, with relay NWP released to close its back contact 24, relay POR is removed from control of the stick circuit of relay ST.

When the switch reaches its reverse locked position, relay RWP is energized over contact 19 of mechanism SM closed in the reverse locked posi-

tion of the switch. The picking up of relay RWP deenergizes relay ST to transmit an indication code indicating that the switch is locked reverse. In this instance, wire 141 is connected to terminal B over front contact 21 of relay RWP so that when relay D at the office is operated, relay RWK picks up over its circuit including front contact 29 of relay D; to cause reverse switch indication lamp RWE to become lighted over front contact 12 of relay RWK and back contact 11 of relay NWK. Relay RWK is held energized in its stick circuit including its front contact 30 and back contact 29 of relay D; when the latter relay releases following the transmission of the complete indication code.

The apparatus functions to indicate operation of switch W from its reverse to its normal position in a similar manner, as will be readily understood.

It will now be assumed that with the switch locked normal so that relay ST is held energized over its stick circuit including front contact 23 of relay POR, front contact 24 of relay NWP, and back contact 25 of relay RWP, a failure of the A. C. power supply occurs. Due to the loss of the A. C. power, relay POR releases to open its front contact 23, thereby interrupting the stick circuit for relay ST, so that an indication code is initiated in the manner previously mentioned. Under the conditions assumed, both switch indication channels of the indication code are energized, the one channel 49-139 over front contact 20 of switch repeater relay NWP; and the other channel 51-141 over a circuit including front contact 20 of relay NWP, back contact 28 of relay POR, and back contact 21 of the deenergized switch repeater relay RWP. It follows that if the alternating current source of power should fail when the switch is locked in its normal position, channels 49-139 and 51-141 are both energized so that both indication relays NWK and RWK at the office are picked up by the indication code, and a circuit is closed including front contact 13 of relay NWK and front contact 12 of relay RWK for indication lamp POE which thereupon becomes lighted to indicate a failure of power at the station. Also, the circuit including front contact 11 of relay NWK is maintained for indication lamp NWE which reflects the normal position of switch W at the station.

The relays NWK and RWK are retained energized over their respective stick circuits when relay D releases following the completion of the code which transmits the power-off indication. It is apparent therefore that the power-off indication lamp POE and normal switch indication lamp NWE will be maintained energized following receipt of the power-off indication, to indicate failure of power at the switch location and to indicate the position of the switch. These two indications will be maintained so long as the position of the switch is not changed and the power failure is not corrected. Upon correction of the power failure, relay POR immediately picks up at the station to open the stick circuit of starting relay ST at back contact 23, thereby initiating transmission of an indication code to the office. During this code, terminal B is applied to wire 139 over front contact 26 of relay NWP but terminal B is disconnected from the other wire 141 because of the opening of back contact 28 of relay POR. The code transmitted under these conditions therefore reflects only the normal position of the switch, and causes the corresponding normal

7

switch indication relay NWK at the office to be energized and the other switch indication relay RWK to be deenergized. The switch indication lamp NWE will be maintained energized, but lamp POE becomes dark with only one indication relay picked up, so that the position of the switch is indicated while the power-off indication is cancelled to indicate restoration of power to the primary source.

It will next be assumed that a failure of the A. C. power occurs when the switch occupies a position other than its normal position, i. e., in either its reverse position or its intermediate position. In either of the latter cases, relay ST will be held energized over its stick circuit which includes back contact 24 of relay NWP, and in such event contact 23 of relay POR is removed from control of the stick circuit of relay ST so that a change in position of relay POR has no effect upon the circuit of relay ST and a failure of power in this instance does not cause any transmission of an indication code and does not affect the indications displayed at the office. Also, the restoration of power when the switch is out of its normal position will not affect the indications at the office because relay POR in picking up does not control the circuit for starting relay ST under the conditions assumed. It is, of course, obvious that the apparatus functions in the usual manner to indicate the transit or reverse position of the switch regardless of whether power is present or absent, because contact 25 of relay RWP is always effective to control the circuit of relay ST to initiate the transmission of an indication code upon a change in position of relay RWP. The codes initiated by relay RWP will energize wire 141 when relay RWP is picked up to close its front contact 21, but when relay RWP is released then terminal B is disconnected from wire 141. In any event, however, the operation of relay RWP will not cause both channels to be energized even though relay POR is released to reflect absence of power, because terminal B is connected to wire 139 only over front contact 29 of relay NWP and so long as that relay remains released, the energization of channel 51—141 only can be controlled by the operation of relay RWP.

If the power should fail when switch W is out of its normal position and the power is not restored when the switch is returned to its normal position, then the indication code transmitted by operation of relay NWP to its picked-up position results in the energization of channel 49—139 over front contact 20 of relay NWP, and channel 51—141 over front contact 20 of relay NWP, back contact 28 of relay POR and back contact 21 of relay RWP so that both switch indication channels become energized to cause the display of both the normal switch and power-off indications at the office. A restoration of the power when the switch is normal will of course be reflected at the office because the code initiated when relay POR picks up will have only a single energized step corresponding to channel 49—139 and in such case relay RWK is released to open the circuit for lamp POE and cancel the power-off indication displayed by that lamp.

In Fig. 2, I have represented the apparatus of Fig. 1 modified to incorporate the communication system of Lewis Patent No. 2,229,249, in place of the system of the Jackel patent used in Fig. 1. Referring now to Fig. 2, the channels 93—113 and 95—115 represented in Fig. 2 correspond respectively to the channels 49—139 and 51—141 of Fig. 1, and these channels of Fig. 2 respectively con-

8

trol relays NWK and RWK in the same manner as explained in connection with the apparatus of Fig. 1. That is, relay NWK is energized over channel 93—113 whenever terminal B is connected to wire 93 over front contact 20 of relay NWP during the transmission of an indication code; and relay RWK is energized over channel 95—115 whenever terminal B is connected to wire 95 during an indication code, the connection of terminal B to wire 95 being effected when relay RWP is picked up, over a circuit including back contact 20 of relay NWP and front contact 21 of relay RWP. Terminal B may also be connected to wire 95 when relay RWP is released, provided that relay POR is released with relay NWP picked up to complete a circuit from terminal B at back contact 31 of relay POR through front contact 32 of relay NWP to wire 95. It is to be seen, therefore, that wire 95 is energized during an indication code when relay RWP is picked up to indicate that switch W occupies its reverse position, and also when relay POR is released to indicate a failure of power when switch W is in its normal position as indicated by relay NWP in its picked-up position. In the latter case, of course, wire 93 will also be energized over front contact 20 of relay NWP so that when relay POR is released and relay NWP is picked up, an indication code transmitted will be effective to pick up both relays NWK and RWK at the office to cause a display of both the normal switch and power-off indications in the manner illustrated in Fig. 1.

A slow releasing repeater relay PORA is provided in Fig. 2 for relay POR and is energized over an obvious circuit including front contact 31 of relay POR.

The station starting relay ST of Fig. 2 is of the normally deenergized type provided with a pick-up circuit completed upon a change of position of relay POR whenever relay NWP is picked up to indicate that switch W occupies its normal position. When relay POR releases with relay NWP picked up, a circuit is completed for relay ST during the slow release interval of repeater relay PORA, this circuit extending from terminal B at front contact 34 of relay NWP, through front contact 35 of relay PORA, back contact 36 of relay POR and the winding of relay ST to terminal C; while when relay POR picks up with relay NWP also picked up, then relay ST is provided with a circuit extending from terminal B at front contact 34 of relay NWP through back contact 35 of relay PORA, front contact 36 of relay POR and the winding of relay ST to terminal C. Relay ST when picked up closes its front contact 33 to initiate the transmission of an indication code in the manner explained in the Lewis patent, thereby establishing the channels 93—113 and 95—115. A selector relay S is also operated by the code, which serves to release relay ST. The relays S and ST function like the similarly designated relays of the Lewis patent, and it is to be understood that the circuits for relay ST include additional branches, not shown herein, so that relay ST becomes energized in response to each change in the positions of relays NWP and RWP.

The apparatus of Fig. 2 functions to control the indication relays NWK and RWK (which in turn control indication lamps NWE, RWE and POE in the manner illustrated in Fig. 1) upon any change in position of the switch repeater relays NWP and RWP (in the manner explained in detail in the Lewis patent) and upon any

change in position of relay POR when relay NWP is picked up, as has been explained hereinbefore. The apparatus of Fig. 2 accordingly functions in a manner corresponding to that described for Fig. 1, to indicate at the office the position of switch W, and to provide at the office an indication pertaining to the primary source of power when the switch occupies its normal position.

My invention therefore provides a simple means for indicating loss of power on the two code steps assigned to indicate the position of a switch. The invention requires the use of but a single relay POR, or alternately a relay POR and its repeater relay PORA, which effect the control of both the starting relay and the power-off indication when the switch occupies its normal position. The operator is thus able to determine whether power from the A. C. source is available for operation of the switch by maintaining the switch in its normal position, or by restoring the switch to its normal position as soon as any movement over the switch in its reversed position has been completed. Inasmuch as the switch usually occupies its normal position and is operated from that position to permit movement of traffic over the switch in its reverse position only when such a movement becomes necessary and for only such a period as is necessary to permit such a movement, the power-off indication provided by my invention is effective to provide adequate information to the operator relating to the A. C. power source.

Although I have herein shown and described only two forms of remote control apparatus embodying my invention, it is to be 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 by invention, what I claim is:

1. In a remote control system, a first movable device having a first and a second and an intermediate position, a first relay picked up only when said first device is in its said first position, a second relay picked up only when said first device is in its said second position, a third relay having a normal and an operated position, an office, a communication system linking said office with said relays and including two indication channels, indication means at said office controlled by said two channels for distinctively indicating the three positions of said first device and the operated position of said third relay, and means controlled by said first and second relays for controlling said indication channels to cause said indication means selectively to reflect the positions of said first device and additionally controlled by said third relay when and only when said first relay is picked up for controlling said indication channels to cause said indication means to indicate the position of said third relay as well as the position of said first device.

2. In combination with a railway track switch having two extreme portions and an intermediate position, a source of current for operating said switch, a power-off relay for said source, a control office provided with a first indication means for indicating the position of said switch and a second indication means for indicating the condition of said power-off relay, a communication system linking said office with said switch and provided with two indication channels over which code elements having one character or another may be transmitted, means controlled

by said switch when said power-off relay indicates presence of power in said source for controlling said communication system so that the code element transmitted over one channel has one character or another depending upon whether or not said switch is in a first of its said two extreme positions and that transmitted over the other channel has one character or another depending upon whether or not said switch is in the second of its said two extreme positions, means controlled by said power-off relay when indicating absence of power in said source effective when and only when said switch occupies a selected one of its said two extreme positions for controlling said communication system so that the elements transmitted over both of said channels have said one character, and means controlled by the character of the code elements transmitted over said channels for controlling only said first indication means when only one of said elements has said other character and controlling both said second indication means and said first indication means when both said elements have said one character.

3. In combination with a power operated railway track switch having two extreme positions and an intermediate position, two indication relays at a control office, a communication system linking said switch location with said office and providing two indication channels one for each indication relay over each of which code elements may be transmitted for energizing the associated indication relay, a source of power at said switch location, a power-off relay connected across said source and released upon failure of power, means for controlling said communication system by said switch and said power-off relay so that when said power-off relay is picked up one or the other of said two indication relays is energized over its channel according as said switch is in one or the other of its two extreme positions and when said power-off relay is released both said indication relays are energized when and only when said switch occupies a selected one of its said two extreme positions, said indication relays each arranged so that when energized by a code element it remains energized until transmission of another code, and means at said office controlled by said indication relays for indicating at all times the position of said switch and additionally effective to indicate the position of said power-off relay when said switch occupies its said selected one extreme position.

4. In combination with a power operated railway track switch having a normal and a reverse and an intermediate position, a control office, a communication system linking said control office with the switch location and providing two indication channels over each of which code elements having one character or another may be transmitted, a source of power at said switch location for supplying energy for power operation of said switch, a power-off relay deriving its energization from said source of power, means for controlling said communication system by said switch when said power-off relay is picked up so that the code element transmitted over one channel has one character or the other depending upon whether or not said switch is in its normal position and that transmitted over the other channel has one character or the other depending upon whether or not said switch is in its reverse position, means effective when and only when said switch is in its said normal position and said power-off relay is released for controlling said communication sys-

tem so the elements transmitted over both of said channels have said one character, a first indication means at said office for reflecting the position of said switch and a second indication means at said office for reflecting the position of said power-off relay, and means for controlling said first indication means at all times in accordance with the character of the code transmitted over said channels and for additionally controlling said second indication means when both said elements have said one character.

5. In combination with a power operated railway track switch having a normal and a reverse and an intermediate position, a control office, a communication system linking said control office with the switch location and providing two indication channels over each of which code elements having one character or another may be transmitted, a source of power at said switch location for supplying energy for power operation of said switch, a power-off relay deriving its energization from said source of power, means for controlling said communication system by said switch when said power-off relay is picked up so that the code element transmitted over one channel has one character or the other depending upon whether or not said switch is in its normal position and that transmitted over the other channel has one character or the other depending upon whether or not said switch is in its reverse position, means controlled by said power-off relay if deenergized effective when and only when said switch occupies its normal position for controlling said communication system so the elements transmitted over both of said channels have said one character, two indication relays at said office one for said one channel and the other for said other channel, each arranged to be energized when its associated channel transmits a code element of said one character and when so energized, retained energized until transmission of another code, two indication lamps one for each indication relay, means controlled by the said one indication relay when picked up for energizing its associated lamp regardless of the position of said other indication relay, means controlled by said other indication relay when picked up for energizing its associated indication lamp provided the said one indication relay is released, and a third indication lamp energized whenever both of said indication relays are picked up.

6. In combination with a power operated railway track switch having a normal and a reverse and an intermediate position, a control office, a communication system linking said control office with the switch location and providing two indication channels over each of which code elements having one character or another may be transmitted, a source of power at said switch location for supplying energy for power operation of said switch, a power-off relay deriving its energization from said source of power, means for controlling said communication system by said switch when in said normal position so that the code element transmitted over one channel has said one character and that transmitted over the other channel has said one character or the other depending upon whether or not said power-off relay is released or picked up respectively, means for controlling said communication system by said switch when in said reverse position so that the code element transmitted over said other channel has said one character and that transmitted over said one channel has said other character, means controlled by said switch when

in its said intermediate position for controlling said communication system so the elements transmitted over both of said channels have said other character, two indication relays at said office one for each of said channels and each arranged to be energized when its associated channel transmits a code element of said one character and when so energized retained energized until transmission of another code, two indication lamps one for each indication relay, means controlled by the one of said indication relays controlled by said one channel and effective when picked up for energizing its associated indication lamp regardless of the position of the other indication relay, means controlled by the other of said indication relays controlled by the said other channel and effective when picked up for energizing its associated lamp provided said one indication relay is released, and a third indication lamp energized whenever both of said indication relays are picked up.

7. In combination with a power operated railway track switch having a normal and a reverse and an intermediate position, a control office, a communication system linking said control office with the switch location and providing two indication channels over each of which code elements having one character or another may be transmitted, a source of power at said switch location for supplying energy for power operation of said switch, a power-off relay deriving its energization from said source of power, means for controlling said communication system by said switch when in said normal position so that the code element transmitted over one channel has said one character and that transmitted over the other channel has said one character or the other depending upon whether or not said power-off relay is released or picked up respectively, means for controlling said communication system by said switch when in said reverse position so that the code element transmitted over said other channel has said one character and that transmitted over said one channel has said other character, means controlled by said switch when in its said intermediate position for controlling said communication system so the elements transmitted over both of said channels have said other character, means at said office for indicating the normal and reverse positions of said switch and controlled by the character of the code elements transmitted over said channels to indicate the normal switch position whenever a code element of said one character is transmitted over said one channel and to indicate the reverse position of said switch only when a code element of said one character is transmitted over said other channel and the code element transmitted over said one channel is of the other character, and means at said office for indicating the released position of said power-off relay effective whenever the elements of both channels have said one character.

8. In combination with a power operated railway track switch having a normal and a reverse and an intermediate position, a normal and a reverse indication relay at a control office, a communication system linking said switch location with said office and providing two indication channels one for each indication relay over each of which code elements may be transmitted for energizing the associated indication relay, means for controlling said communication system by said switch so that the said normal or the said reverse indication relay is energized over its channel ac-

13

cording as said switch is in its said normal or
 reverse position respectively and neither of said
 relays is energized over its corresponding chan-
 nel when said switch is in its said intermediate
 position, a source of power at said switch loca-
 tion for supplying energy for power operation of
 said switch, a power-off relay connected across
 said source and released upon failure of power,
 means for controlling said communication sys-
 tem by said power-off relay when released effec-
 tive only when said switch occupies its normal
 position so that both indication relays are en-
 ergized over their corresponding channels, each
 of said indication relays being arranged so that
 when energized by a code element it remains
 energized until transmission of another code, a
 normal switch position indication means and a re-
 verse switch position indication means and a
 power-off indication means at said office, and
 means controlled by said indication relays for
 energizing said normal switch position indication
 means whenever said normal indication relay is
 energized and for energizing said reverse switch
 position indication means whenever said reverse
 indication relay is energized provided said normal
 indication relay is deenergized and for energizing
 said power-off indication means whenever both of
 said indication relays are energized.

9. In a remote control system, a first movable 30

14

device having a first and a second and an inter-
 mediate position, a first relay picked up only
 when said first device is in its said first position,
 a second relay picked up only when said first de-
 vice is in its said second position, a third relay
 having a normal and an operated position, an
 office, a communication system linking said office
 with said relays and including two indication
 channels, two indication relays at said office con-
 trolled respectively by said two channels, a start-
 ing relay at said switch location for establishing
 said indication channels operative upon any
 change of position of said first and second re-
 lays and upon any change of position of said
 third relay only when said first relay is picked up,
 means effective following operation of said start-
 ing relay for controlling said channels to pick up
 a first of said indication relays whenever said
 first relay is picked up and to pick up the second of
 said indication relays whenever said second re-
 lay is picked up or said third relay is in its
 operated position and said first relay is picked
 up, and means at said office controlled by said
 indication relays for selectively indicating the
 position of said first device and also indicating the
 position of said third relay only when said first
 device is in its said first position.

HENRY S. YOUNG.

No references cited.