

April 16, 1935.

H. A. WALLACE

1,998,178

REMOTE CONTROLLING APPARATUS

Original Filed Sept. 23, 1931 2 Sheets-Sheet 1

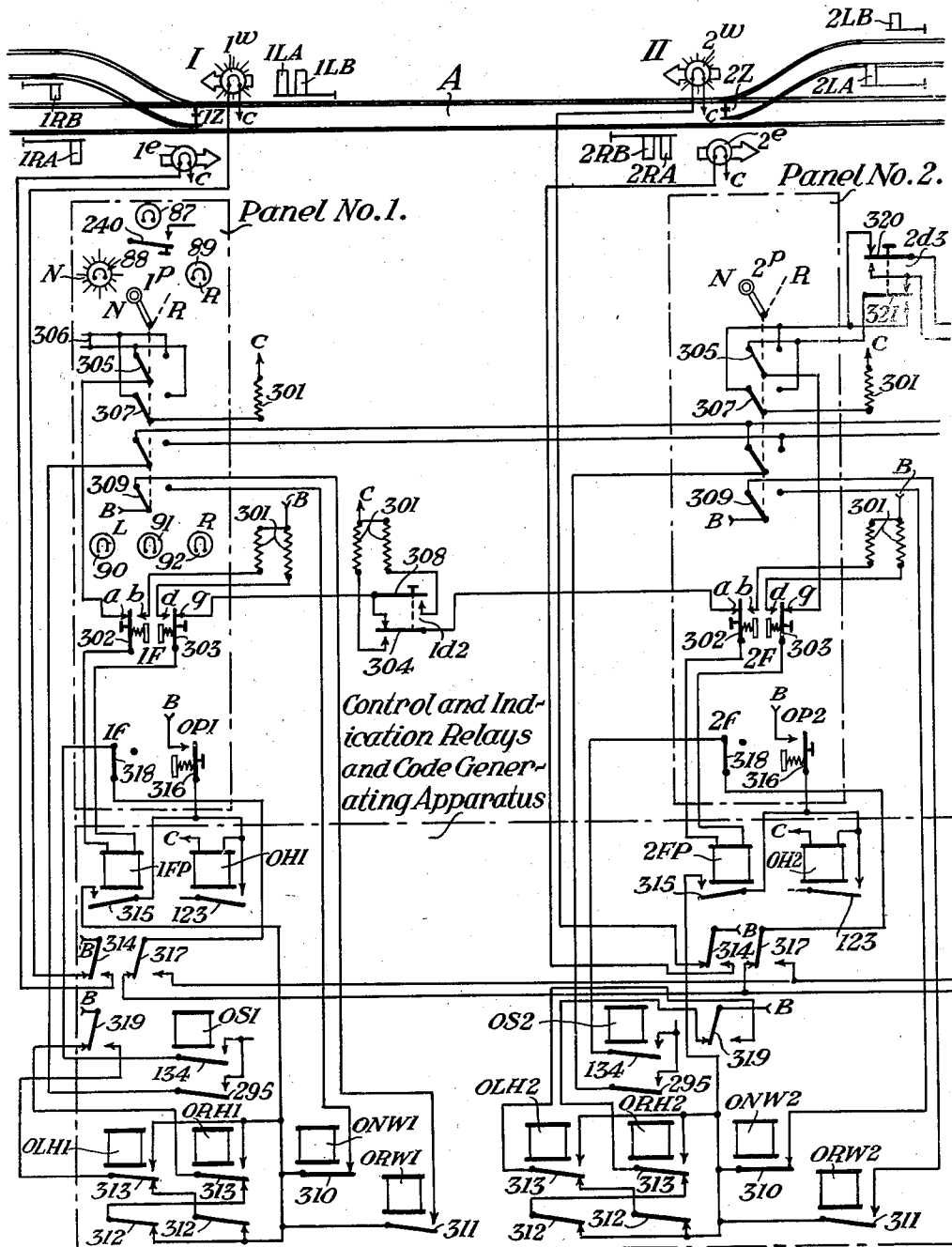


Fig. 1a

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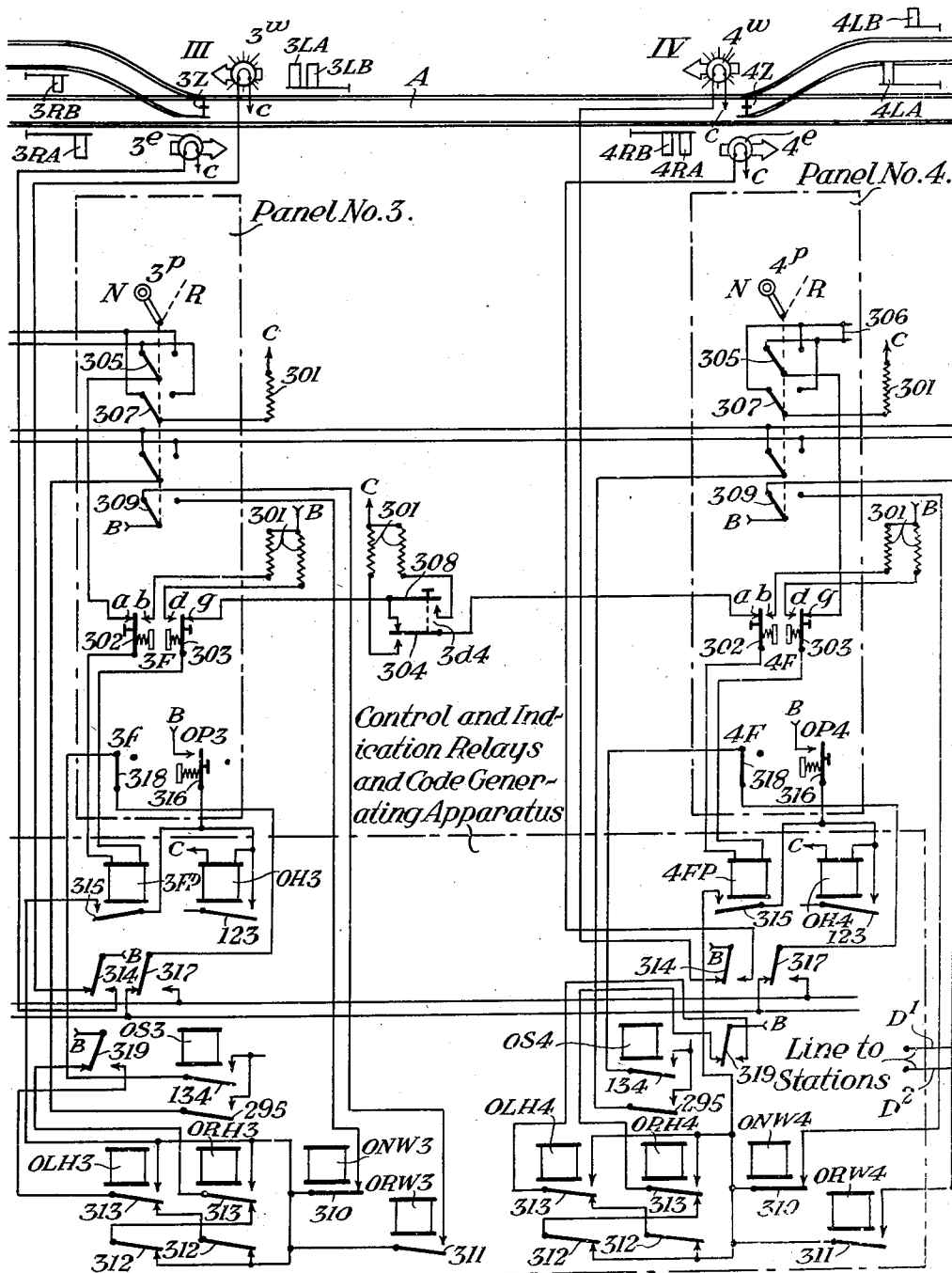


Fig. 1b

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REMOTE CONTROLLING APPARATUS

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Continuation of application Serial No. 564,578,
September 23, 1931. This application August
11, 1933, Serial No. 684,678

21 Claims. (Cl. 246—3)

My invention relates to remote controlling apparatus, and particularly to apparatus for controlling a plurality of train governing devices, such as railway switches and signals, from a remote point, such, for example, as a train despatcher's office.

One feature of my invention is the provision of means for reducing the number of manual operations necessary for controlling each of various groups of such train governing devices.

The present case is a continuation of my co-pending application, Serial No. 564,578 filed September 23, 1931, for Remote controlling apparatus.

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

The accompanying drawings, Figs. 1^a and 1^b, when placed side by side with Fig. 1^a on the left, constitute a diagrammatic view showing one form of apparatus embodying my invention.

Referring to the drawings, the reference character A designates a diagram of a stretch of railway track having four switch and signal stations designated by the Roman numerals I, II, III, and IV, respectively. As here shown, each of these stations comprises a switch and four signals for governing traffic movements over the switch. For example, station I comprises switch 1Z, signals 1LA and 1LB for governing the movement of traffic from right to left over switch 1Z, and signals 1RA and 1RB for governing the movement of traffic from left to right over switch 1Z. The switches and signals at stations II, III and IV are designated by reference characters which are similar to those for the switches and signals at station I, except that they include the numerals 2, 3 and 4, respectively, instead of the numeral 1.

The switch and signals of each of these stations are controlled from a remote point, such, for example, as a train despatcher's office. Diagram A representing a stretch of track with four switch and signal stations each of which comprises one switch and four signals, is suitably placed in the despatcher's office. Mounted adjacent the symbols for the signals and switch for each station, are two indicators which are here shown as electric lamps, one of which designated by a distinguishing numeral with the exponent *e*, is arranged to illuminate an arrow pointing toward the right, and the other of which, designated by a distinguishing numeral with the exponent *w*, is arranged to illuminate an arrow pointing toward the left. The purpose

of these indicators is to indicate the direction of traffic established by the despatcher as will be explained hereinafter.

Mounted in the despatcher's office adjacent diagram A, are control panels numbered 1, 2, 3 and 4 for stations I, II, III and IV, respectively. Each of these control panels is equipped for controlling code transmitting and receiving apparatus in the despatcher's office, such, for example, as that shown and described in a pending patent application, Serial No. 373,675, filed June 25, 1929, by Lloyd V. Lewis, for Remote controlling apparatus. On panel number 1, I have shown indication lamps 87, 88, 89, 90, 91 and 92 and switch 240, which are the same as the parts having like reference characters in the Lewis application, and which have the same circuits, not shown in the drawings, as are shown for the same parts in the Lewis application. The other panels, 2, 3, and 4, may be similarly equipped.

The switch and the signals at each of the stations I, II, III and IV may be controlled by control codes transmitted from the despatcher's office in the manner shown and described in the Lewis application.

Each of the panels numbered 1, 2, 3 and 4 has a switch control lever designated by the reference character *p* with a prefix corresponding to the number of the panel. In my invention, each lever *p* is provided with three contacts 305, 307 and 309 in addition to the similar contacts shown for lever *lp* in the Lewis application. I have shown, without a number, on each of the panels 1, 2, 3, and 4, the contact of each lever *p* which corresponds to the contact of lever *lp* shown on panel number 1 in the Lewis application, and which, as in the Lewis application, is connected to contact 295 of relay OSI and is for the purpose of determining the character of certain elements of a control code to control a switch in accordance with the position of lever *p*.

Mounted on each of the panels 1, 2, 3 and 4 is a pair of mutually independent push button circuit controllers, one of which has a contact arm 302 and the other of which has a contact arm 303. Each pair of circuit controllers is designated by the reference character F with a prefix corresponding to the number of the panel. These circuit controllers are used for clearing the signals, instead of the lever *lp* in the Lewis application. Whereas in the Lewis application, lever *lp* is used for controlling only one signal at a time, each of the push button circuit controllers in my invention may be used for con-

trolling a variable plurality of signals governing the movement of traffic in the same direction. Each of the push button contact arms 302 and 303 is spring biased to its released position shown in the drawings, as indicated by the spring applied to arm 302 of circuit controller 1F. Each contact arm 302 when in its released position connects with a contact *a*, but when depressed it becomes disconnected from contact *a* and connects with a contact *b* for controlling signals governing traffic moving from left to right. Each contact arm 303 when in its released position connects with a contact *g*, but, when depressed, it becomes disconnected from contact *g* and connects with a contact *d*, for controlling signals governing traffic moving from right to left.

Mounted on each panel is also a signal lever designated by the reference character *f* with a prefix corresponding to the number of the panel. Each lever *f* is provided with a contact 318, which is normally closed as shown in the drawings. When a lever *f* is moved toward the right, to its reverse position, its contact 318 opens. This has the same result as is secured in the Lewis application by moving signal lever 1*q* to its intermediate position so that its contacts L and R are both open. Each lever *f* is for separately controlling a track switch Z, without clearing one of the associated signals, or for controlling one of the associated signals from "clear" to "stop".

A push button circuit controller 1*d2*, provided with two contacts 304 and 308, is at times used in conjunction with a circuit controller of one of the pairs F, as will be described hereinafter. A second push button 3*d4*, provided with two contacts 304 and 308, and a third push button 2*d3*, provided with two contacts 320 and 321 are also at times used in conjunction with a circuit controller of one of the pairs F.

Polarized signal control relays, designated by the reference character FP with prefixes corresponding to the numbers of the associated control panels, are controlled by the signal circuit controllers of pairs F in conjunction with switch levers *p* and circuit controllers 1*d2*, 2*d3* and 3*d4*. Resistance units 301, having various values of resistance according to their location, are used in various operations of the circuits for relays FP in order to secure approximately uniform current strength in the various circuits when various numbers of relays FP are operated at the same time.

Each relay FP is so constructed that when the relay becomes deenergized, its polar contacts remain closed in the positions to which they were last moved until the relay again becomes energized by current of the other polarity.

The circuits including contacts 317, 318 and 134 correspond to the circuits including lever 1*q* and contact 134 in the Lewis application, these circuits being for the purpose of determining the character of certain elements of a control code for controlling the signals in accordance with the positions of lever *f* and of contact 317. The energization of a relay FP by closing a contact 302 of a pair F causes the right-hand contact 317 to close, for clearing a signal such as 1RA or 1RB governing traffic moving toward the right, while the energization of a relay FP in the opposite direction by closing a contact 303 of a pair F causes contact 317 to move to the left-hand position shown in the drawing, for clearing a signal such as 1LA or 1LB governing traffic moving toward the left. The opening of contact 318 of a lever *f* while a control code is

being transmitted will cause the signals at the corresponding station to assume their stop position.

Each of the code starting relays OH1, OH2, OH3 and OH4 has a pick-up circuit controlled by contact 316 of a starting push button OP1, and a stick circuit, including its contact 123, which is exactly similar to the stick circuit shown for relay OH1 in the Lewis application. Other pick-up circuits are provided, however, for these relays in my application in addition to the pick-up circuit through contact 316. These additional pick-up circuits for relay OH1, for example, are controlled by the neutral contact 315 of relay 1FP, and include one or more of the contacts 310 to 313, inclusive, which I have added to the indication storing relays ONW1, ORW1, OLH1 and ORH1 of the Lewis application. The circuits for controlling relays ONW1, ORW1, OLH1 and ORH1 are the same as those shown in the Lewis application for relays having the same reference characters, and are hence omitted from the drawings in my present application.

The purpose of these additional pick-up circuits for relay OH1 is to provide an arrangement for transmitting a plurality of codes, which avoids the transmission of unnecessary codes, and these circuits function in such a manner that a control code will not be transmitted when a relay FP is picked up as the result of operation of one of the circuit controllers F if the positions of the indication relays for a station indicate that the switch and signals at such station already occupy the positions to which they would be moved by the code. Thus if signal 1LA or 1LB is clear so that relay OLH1 is energized, and if relay 1FP is energized momentarily to the left to the position shown in the drawing, the pick-up circuits for relay OH1 which include left-hand contact 319 will be open at the back contact 312 of relay OLH1, and the initiation of a code by this circuit is prevented; on the other hand, if an opposing signal is clear so that ORH1 is energized, the pick-up circuit will be closed over front contact 313 of relay ORH1, while if the signals for both directions of traffic are at stop so that relays OLH1 and ORH1 are deenergized, a pick-up circuit will be closed over back contacts 313 and 312 of relays OLH1 and ORH1, so that the momentary energization of relay FP will cause the transmission of a code. Since these circuits are symmetrically arranged for the two directions, it is clear that similar results with respect to the opposing signal are obtained when relay 1FP is energized in the opposite direction. Furthermore, even though the signal control and indication correspond, the initiation of a control code is not prevented unless the switch control and indication are in agreement. Thus if the switch is normal so that relay ONW1 is energized, but the switch lever 1*p* is reversed, a pick-up circuit for relay OH1 will be closed over the right-hand or reverse contact of 1*p* and front contact 310 of relay ONW1, but this circuit will not be available if the switch is reversed and relay ORW1 is energized and ONW1 deenergized. In the latter case, a pick-up circuit including contact 311 of relay ORW1 and the normal or left-hand contact of 1*p* will be closed, which circuit is not available when the switch is indicated as being in its normal position. It is clear, therefore, that a control code will be transmitted when 1FP is picked up in all cases except when the indicated positions of the switch and signal are those to

which they would be moved as the result of sending the code.

Other control and indication relays and code apparatus, not shown in my present application, may be controlled in the same manner as in the Lewis application.

Having described, in general, the arrangement and location of the various parts, I will now describe in detail the operation of one form of apparatus embodying my invention.

I will assume that, as shown in the drawings, switch levers *p* are in the normal position as indicated by reference N, that all switches are normal and that all signals are at stop, that contact arms 302 and 303 of pairs F are in their released positions, and that signal levers *f* are in their closed position.

I will also assume that a train moving from left to right is approaching signal 1RA, and that the despatcher wishes to permit this train to move through the stretch represented by the diagram A over the route which includes all switches in the normal position and which is governed by the main line signals 1RA to 4RA, inclusive. The despatcher will depress contact arm 302 of pair 1F thereby completing a circuit passing from terminal B of a suitable source of current, not shown in the drawing, through a resistance unit 301, contact 302—*b* of pair 1F, winding of relay 1FP, contact 303—*g* of pair 1F, normally closed contact 304 of circuit controller 1d2, contact 302—*a* of pair 2F, winding of relay 2FP, contact 303—*g* of pair 2F, normal contact 305 of lever 2p, contact 321 of circuit controller 2d3, normal contact 305 of lever 3p, contact 302—*a* of pair 3F, winding of relay 3FP, contact 303—*g* of pair 3F, contact 304 of circuit controller 3d4, contact 302—*a* of pair 4F, winding of relay 4FP, contact 303—*g* of pair 4F, normal contact 305 of lever 4p, jumper wire 306, normal contact 307 of lever 4p, and resistance unit 301 to terminal C of the same source of current.

Upon completion of the circuit just traced, relays 1FP, 2FP, 3FP and 4FP are energized to close their neutral contacts 315 and also their right-hand polar contacts 314, 317 and 319. Contact 315 of relay 1FP, upon being closed, completes a pick-up circuit for relay OH1 passing from terminal B, through right-hand contact 319 of relay 1FP, back contact 313 of relay OLH1, back contact 312 of relay ORH1, contact 315 of relay 1FP, and relay OH1 to terminal C. Relays OH2, OH3 and OH4 become energized by similar pick-up circuits passing through contacts 315 and 319 of relays 2FP, 3FP and 4FP, respectively. Each of the relays OH1, OH2, OH3 and OH4, upon becoming energized, completes its own stick circuit through its front contact 123, by which it is held energized after the contact arm 302 of pair 1F has been released by the despatcher and has returned to the normal position causing the relays FP to become deenergized and open their front contacts 315 in the pick-up circuits for relays OH1, OH2, OH3 and OH4.

The energization of starting relay OH1 initiates the transmission of a control code, causing station selector relay OS1 to become energized to close its contacts 134 and 295, to complete certain circuits through contact 134 of relay OS1, contact 318 of lever 1f, and right-hand contact 317 of relay 1FP, and through contact 295 and the normal contact of lever 1p, for clearing signal 1RA. The energization of relays 2FP, 3FP and 4FP similarly causes control codes to be trans-

mitted one at a time in sequence for clearing signals 2RA, 3RA and 4RA.

The result of the operation of the contact arm of pair 1F, with all switch levers *p* in their normal positions, is therefore to clear all main line signals for a train movement through the entire stretch of territory represented by diagram A.

At the conclusion of the operations resulting from the transmission of these codes, indication codes will be transmitted from each station in turn to energize indication relays ONW and ORH for each panel to cause the energization of indication lamps 88 and 92 for each panel. All of these operations are carried out in the manner described in the Lewis application.

Since the polar contacts of relay 1FP are closed to the right, a circuit is completed for indicator lamp 1^e adjacent switch 1Z of diagram A, and passes from terminal B, through the right-hand contact 314 of relay 1FP, and lamp 1^e to terminal C. Indicator lamps 2^e, 3^e and 4^e are also lighted by similar circuits. The lighting of these lamps or of the similar lamps 1^w to 4^w, inclusive, for the opposite direction, gives a continuous indication to the despatcher of the position of the polar contacts of the relays 1FP, 2FP, 3FP and 4FP after the contact arm of a pair F has been released. In this way, the despatcher is kept informed as to the direction of traffic which he has established at each station along the stretch of track represented by diagram A.

I will next assume that with signals 1RA, 2RA, 3RA and 4RA cleared for a traffic movement from left to right through the stretch of track represented by diagram A, the despatcher decides to have a train moving toward the right meet and pass an opposing train at the siding between stations II and III, the first mentioned train to proceed along the main line, and the opposing train to enter the siding over switch 3Z reversed. The despatcher will, therefore, permit signals 1RA and 2RA to remain at clear, but will move switch control lever 3p to its reverse position R for reversing switch 3Z, and will also depress contact arm 303 of pair 4F, for reversing switch 3Z and for clearing signals 4LA and 3LB.

The operation of contact arm 303 of circuit controller pair 4F completes a circuit passing from terminal B, through a resistance unit 301, contact 303—*d* of pair 4F, winding of relay 4FP, contact 302—*a* of pair 4F, contact 304 of circuit controller 3d4, contact 303—*g* of pair 3F, winding of relay 3FP, contact 302—*a* of pair 3F, reverse contact 305 of lever 3p, contact 320 of circuit controller 2d3, and normal contact 307 of lever 2p, through resistance unit 301 to terminal C. The circuit just traced through relays 3FP and 4FP causes these relays to become energized in a direction to close their left-hand contacts.

Neutral contact 315 of relay 3FP, upon being closed, completes a pick-up circuit for relay OH3 passing from terminal B, through reverse contact 309 of lever 3p, contact 310 of relay ONW3, contact 315 of relay 3FP and relay OH3 to terminal C. With the left-hand contact 317 of relay 3FP closed and with lever 3p reversed, a control code is transmitted to station III for causing switch 3Z to become reversed and signal 3LB to clear.

Neutral contact 315 of relay 4FP, upon being closed, completes a pick-up circuit for relay OH4 passing from terminal B, through left-hand contact 319, front contact 313 of relay ORH4, contact 315 of relay 4FP and relay OH4 to terminal C. With the left-hand contact of relay 4FP closed and with lever 4p normal, a control code is

transmitted to station IV for causing signal 4LA does not become effective until the main line train, moving toward the right, has passed beyond the opposing signal 2LA.

The result of the operation of contact arm 303 of pair 4F, with switch lever 4p normal and 3p reversed, is therefore to cause signal 3RA to assume the stop position so as to permit a train movement from left to right up to signal 3RA only, and to reverse switch 3Z and to clear signals 4LA and 3LB to permit the movement of an opposing train up to signal 2LB.

At the conclusion of the operations resulting from the transmission of these codes, indication codes will be transmitted from stations III and IV for energizing indication relays ORW3, OLH3, ONW4 and OLH4, to light indication lamps 89 and 90 of panel 3 and lamps 88 and 90 of panel 4.

When the despatcher is informed by the lighting of the track indication lamps 87 of panels 2 and 3 as the result of the transmission of indication codes initiated by the entrance of the trains into the respective switch sections as described in the Lewis application, that the train moving toward the left has passed signal 3LB, and that the train moving toward the right has passed signal 2RA, he will return lever 3p to normal and will reverse lever 2p. He will then depress contact arm 302 of pair 3F to transmit two codes, one to station III for restoring switch 3Z to normal and for clearing signal 3RA, and the other to station IV for clearing signal 4RA, and will depress contact arm 303 of pair 2F to transmit two codes, one to station I for clearing signal 1LA and the other to station II for reversing switch 2Z and for clearing signal 2LB.

The operation of contact arm 302 of pair 3F completes a circuit through the windings of relays 3FP and 4FP passing from terminal B, through a resistance unit 301, contact 302—b of pair 3F, winding of relay 3FP, contact 303—g of pair 3F, contact 304 of circuit controller 3d4, contact 302—a of pair 4F, winding of relay 4FP, contact 303—g of pair 4F, normal contact 305 of lever 4p, jumper wire 306, normal contact 307 of lever 4p, and resistance unit 301 to terminal C. This circuit causes relays 3FP and 4FP to become energized to close their neutral and right-hand polar contacts. Relay OH3 becomes energized, and with the right-hand contacts of relay 3FP closed and with lever 3p in its normal position, a control code is transmitted to station III for causing switch 3Z to be returned to its normal position and for clearing signal 3RA. This code, of course, does not become effective until the train entering the siding has passed beyond the opposing signal 3RB. Relay OH4 also becomes energized and a control code is transmitted to station IV for clearing signal 4RA.

The operation of contact arm 303 of circuit controller pair 2F completes a circuit through the windings of relays 1FP and 2FP passing from terminal B, through a resistance unit 301, contact 303—a of pair 2F, winding of relay 2FP, contact 302—a of pair 2F, contact 304 of circuit controller 1d2, contact 303—g of pair 1F, winding of relay 1FP, contact 302—a of pair 1F, normal contact 305 of lever 1p, jumper wire 306, and normal contact 307 of lever 1p, through resistance unit 301 to terminal C. This circuit causes relays 1FP and 2FP to be energized to close their neutral and left-hand polar contacts, to cause a control code to be transmitted to station I for clearing signal 1LA and a code to be transmitted to station II for reversing switch 2Z and for clearing signal 2LB.

The code transmitted to station II, of course,

The result of the operation of contact arms 303 of pair 2F and 302 of pair 3F, with switch lever 2p reversed and 3p normal is therefore to reverse switch 2Z and to permit the train moving toward the left to pass signal 2LB at clear and to continue to the end of the territory represented by diagram A, and also to restore switch 3Z to normal and to permit the train moving toward the right to pass signal 3RA at clear and to continue to the other end of the territory represented by the diagram.

At the conclusion of the operations resulting from the transmission of these control codes, indication codes will be transmitted from each station in turn in the usual manner.

I will now assume that with all switches normal and all signals at stop, the despatcher wishes to clear signal 1RA for a train moving toward the right, but that he is not ready to permit the train to pass station II and that he wishes to retain signals 2RA and 2RB at stop. He will therefore depress push button 1d2 and will then depress contact arm 302 of pair 1F, thereby completing a circuit passing from terminal B, through a resistance unit 301, contact 302—b of pair 1F, winding of relay 1FP, contact 303—g of pair 1F, contact 308 of circuit controller 1d2, through resistance unit 301 to terminal C. This circuit causes relay 1FP to be energized to close its neutral and right-hand polar contacts, and a control code will be transmitted for clearing signal 1RA. None of the other relays 2FP, 3FP and 4FP being energized by the circuit just traced while push button 1d2 is depressed, the only control code transmitted will be the one for clearing signal 1RA, and hence no other signals will change indications.

I will now assume that with all switches normal and all signals at stop, the despatcher wishes to permit the train approaching station II from the left to continue on the main line, but to hold it at signal 3RA. That is, he wishes to clear signal 2RA without changing any of the signals at any of the other stations. To do this, he will depress push button 2d3 and will then depress contact arm 302 of pair 2F, thereby completing a circuit passing from terminal B, through resistance unit 301, contact 302—b of pair 2F, winding of relay 2FP, contact 303—g of pair 2F, normal contact 305 of lever 2p, normally open contact 321 of circuit controller 2d3, normal contact 307 of lever 2p, and resistance unit 301 to terminal C. This circuit causes relay 2FP to become energized to close its neutral and right-hand polar contacts, and hence a control code will be transmitted for clearing signal 2RA.

It will be clear that by a similar manipulation the despatcher may clear signals 1RA and 2RA without changing any of the signals at stations III or IV, by depressing push button 2d3 and contact arm 302 of pair 1F, or he may clear signals 1RA, 2RA and 3RA without changing the signals at station IV, by depressing push button 3d4 and contact arm 302 of pair 1F.

It will be clear from the foregoing that my apparatus provides facilities whereby the despatcher may quickly clear a route for the movement of a train over the whole or any desired portion of a stretch of track containing a large number of switches and signals, by moving as many of the switch levers of his control panels as is necessary in order to select the route that he desires

to establish, and by then depressing the push button F at the entrance of the selected route for the traffic direction that he desires to establish. The extent of the territory thus controlled may be limited either by placing the switch lever at the end of the selected route in a conflicting position, as ordinarily will be done when a meet is to be arranged for two opposing trains, or by operating one of the push buttons d. That is, the simultaneous operation of any push button F and one of the push buttons d results in clearing a route from the point in the track corresponding to the operated push button F to the operated push button d, provided the switch levers are so aligned that a route is indicated as available from F to d on the despatcher's control panels. Ordinarily the extent of territory that is under the control of a despatcher is very much larger than the stretch that for simplicity has been illustrated herein and may comprise an entire division of a railroad. By the employment of my invention, a despatcher is enabled to control all of the switches and signals included in a much larger extent of territory than he would be able to control if a separate manipulation were required to control each switch and signal of a route for every train movement.

I have described, for a few typical traffic movements, the operation of one form of apparatus embodying my invention. The operation of the apparatus for every other possible traffic movement will therefore be readily understood by reference to the drawings.

Although I have shown and described my invention applied to the system shown and described by L. V. Lewis in his application for Letters Patent of the United States, Serial No. 373,675, filed June 25, 1929, for Remote controlling apparatus, it is to be understood that my invention is equally applicable to other systems of remote control.

Although I have herein shown and described only one form of remote controlling 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, a plurality of control relays one for each of a plurality of code controlled stations, manually controllable means for at times connecting said relays in series for energizing them, a plurality of code starting relays one for each of said stations for starting a code for controlling the associated station, and means controlled by the control relay for each station for controlling the associated code starting relay.

2. In combination, a plurality of control relays one for each of a plurality of code controlled stations, manually controllable means for at times connecting said relays in series for energizing them, and means controlled by each of said relays for controlling code generating apparatus for controlling the associated station.

3. In combination, a plurality of control relays one for each of a plurality of code controlled stations, manually controllable means for connecting a variable number of said control relays in series for energizing said variable number of relays, and means controlled by each of said relays for controlling code generating apparatus for controlling the associated station.

4. In combination, a plurality of code controlled stations, a code starting relay for each sta-

tion for starting a code for controlling the associated station, a circuit controller, and means controlled by said circuit controller for at times energizing a plurality of said starting relays.

5. In combination, a stretch of railway track, a plurality of railway traffic governing devices spaced along said stretch, a relay for each of said devices for controlling the associated device, a plurality of pairs of manually controllable circuit controllers one pair for each of said devices and each circuit controller of each pair having a normal position to which it is biased and also having a reverse position, a circuit including said relays in series and said circuit controllers in their normal position, means controlled by one circuit controller of each pair in its reverse position for energizing a given group of said relays, and means controlled by the other circuit controller of the same pair in its reverse position for energizing a second group of said relays.

6. In combination, a stretch of railway track including a plurality of consecutive stations each comprising a track switch and a signal for governing traffic movements over said switch, manually controllable means, means controlled by a single given operation of said manually controllable means for causing the signals to indicate "proceed" at a given number of said stations, and means controlled by a second given operation of said manually controllable means for causing the signals to indicate "proceed" at a different number of said stations.

7. In combination, a stretch of railway track including a plurality of consecutive stations each comprising a track switch and a signal for governing traffic movements over said switch, manually controllable means, means controlled by said manually controllable means for causing the signals to indicate "proceed" at a variable number of said stations, indication apparatus, and means controlled by said manually controllable means for causing said indication apparatus to indicate the condition of said manually controllable means.

8. In combination with a track switch and a signal for governing traffic over the switch, code transmitting means at a remote office for selectively operating the switch and the signal, normally energized switch indication means at the office adapted to indicate the condition of the switch, and means at the office controlled by said indication means for controlling the code transmitting means.

9. In combination with manually controlled apparatus for transmitting different control signals to a remote point for selectively controlling the positions of a railway switch located at such remote point and a signal governing traffic over such switch, means for indicating the position of said switch at said remote point, and manually controlled means for at times placing said apparatus under the control of said switch indication means.

10. In combination with a two position track switch, a two position control lever, transmitting means effective when actuated to operate said switch to a position corresponding to the position of said lever, indication means for indicating the position of the switch, a manually operable starting key for actuating said transmitting means, and means for preventing the actuation of said transmitting means when said key is operated provided the position of the lever corresponds to the position of the switch as indicated by said indication means.

11. In combination with a two position track switch, a plurality of signals for governing traffic over the switch, manually controllable switch and signal control means, transmitting means for operating said switch and signals to positions corresponding to the positions of said control means, switch and signal indication means for indicating the positions of said switch and signals, a manually operable starting key for actuating said transmitting means, and means for preventing the actuation of said transmitting means when said key is actuated provided the positions of the switch and signal control means correspond to the positions of the switch and signals as indicated by said indication means.
12. In a centralized traffic control system for railroads, a plurality of signals spaced at intervals along a stretch of railway track for governing the movement of traffic in the same direction, transmitting means at a control office for transmitting codes effective to selectively clear said signals, control means for each signal effective when operated to actuate said transmitting means to transmit a code to clear the corresponding signal, indication means for indicating the condition of each signal, and means effective when any one of said control means is operated to actuate said transmitting means to transmit additional codes to clear each signal in said stretch in advance of the signal corresponding to said control means, said means including means to prevent the transmission of a code to clear any signal indicated clear by said indication means.
13. In combination with a plurality of railway signals, transmitting means for each signal for selectively clearing said signal, control means effective when operated to actuate said transmitting means to clear each of said signals in turn, indication means for indicating the condition of each signal, and means effective when said control means is operated to prevent the actuation of each transmitting means for any signal which is indicated clear by said indication means.
14. In a centralized traffic control system for railroads, a stretch of railway track, a plurality of signals at different points in said stretch for controlling the movement of traffic through said stretch, a control relay for each signal at a control office, a normally open control circuit including all of said relays in series, means for closing a portion of said circuit between any two selected points in said circuit to energize a selected plurality of said relays, and means rendered effective when each relay becomes energized for clearing the corresponding signal.
15. In a centralized traffic control system for railroads, a stretch of railway track, a plurality of pairs of opposing signals at different points in said stretch for controlling the movement of traffic in one direction or the other through said stretch, a polarized control relay for each pair of signals at a control office, a normally open control circuit including all of said relays in series, means for closing a portion of said circuit between any two selected points in said circuit to energize a selected plurality of said relays in one direction or the other, and means rendered effective when each relay becomes energized for clearing one signal or the other of the corresponding pair in accordance with the direction of energization of such relay.
16. In combination with a track switch and a signal for governing traffic over the switch, manually controllable switch and signal control contacts at a control office, code transmitting means effective when operated to control the switch and the signal to positions corresponding to the positions of said levers, indication means at the office adapted to continuously indicate the position of the switch and of the signal, and a manually operable contact effective when closed momentarily to initiate the operation of the code transmitting means provided the position of the switch or of the signal indicated by said indication means is out of correspondence with its control contact.
17. In a centralized traffic control system for railroads, an office and a plurality of stations, code transmitting means for establishing communication between said office and said stations, one station at a time, to control traffic governing devices at the stations, a group of control levers in the office for each station for determining the control to be effected by said transmitting means, a stick relay for each group of levers effective when energized to initiate the operation of said transmitting means to select the station corresponding to such group, a main starting circuit including a manually operable contact, means effective when said starting circuit is closed to simultaneously energize all of said stick relays, and a stick circuit for each stick relay closed when the relay is energized and opened when the corresponding station has been selected.
18. In combination with a stretch of railway track including a plurality of track switches, code transmitting means at a control office for controlling said switches, a group of control levers at said office including one for each switch for determining the control to be effected by said transmitting means, a starting circuit including contacts of all said levers in series and arranged to be closed only when a non-conflicting route through said stretch will be rendered available by the operation of said code transmitting means in accordance with the positions of said levers, means effective when said starting circuit is closed for initiating the operation of said transmitting means to effect the control of said switches, and manually operable means for closing said starting circuit.
19. In combination with a stretch of railway track including a plurality of track switches, transmitting means at a control office for controlling said switches, a group of control levers at said office including one for each switch for determining the control to be effected by said transmitting means, a manually operable contact for each lever, effective when closed to initiate the operation of the transmitting means in accordance with the position of the corresponding lever, and other manually operable means effective when operated to initiate the operation of said transmitting means to effect the operation of a plurality of said switches, each in accordance with the position of the corresponding lever, if and only if a non-conflicting route through said stretch will be rendered available by such operation.
20. Apparatus for the remote control of movable devices comprising a plurality of levers, one for each device, each lever having at least two positions in each of which a normally inactive control contact is closed, a starting circuit associated with each lever, means effective when each said starting circuit is closed momentarily to complete a circuit over the closed control contact of the associated lever to effect the movement of the corresponding device to a position determined by the position of said lever; manually

operable means for each circuit for closing said circuit momentarily and individually, and other means for momentarily closing a selected plurality of said circuits simultaneously.

- 5 21. In a centralized traffic control system for railroads, an office and a plurality of stations, transmitting means for establishing communication between said office and said stations to control traffic governing devices at the stations, a
10 group of control levers in the office for each station for determining the control to be effected

by said transmitting means, a starting relay for each group of levers effective when actuated to initiate the operation of said transmitting means to select the station corresponding to said group, a main starting circuit including a manually operable contact, means effective when said starting circuit is closed to actuate all of said starting relays, and means for restoring each starting relay rendered effective when the corresponding station is selected.

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