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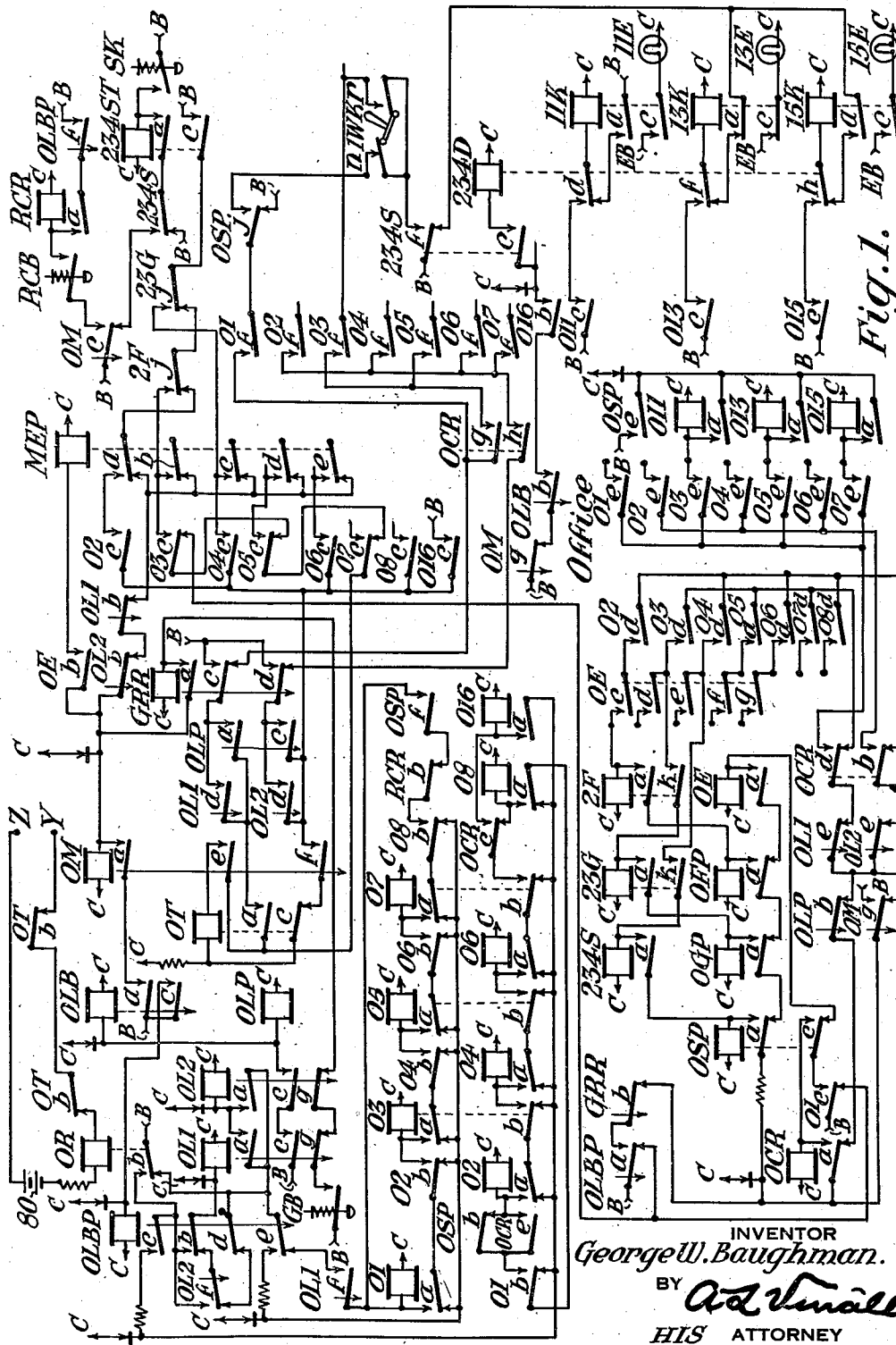
G. W. BAUGHMAN

2,396,812

REMOTE CONTROL SYSTEM

Filed Aug. 27, 1943

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

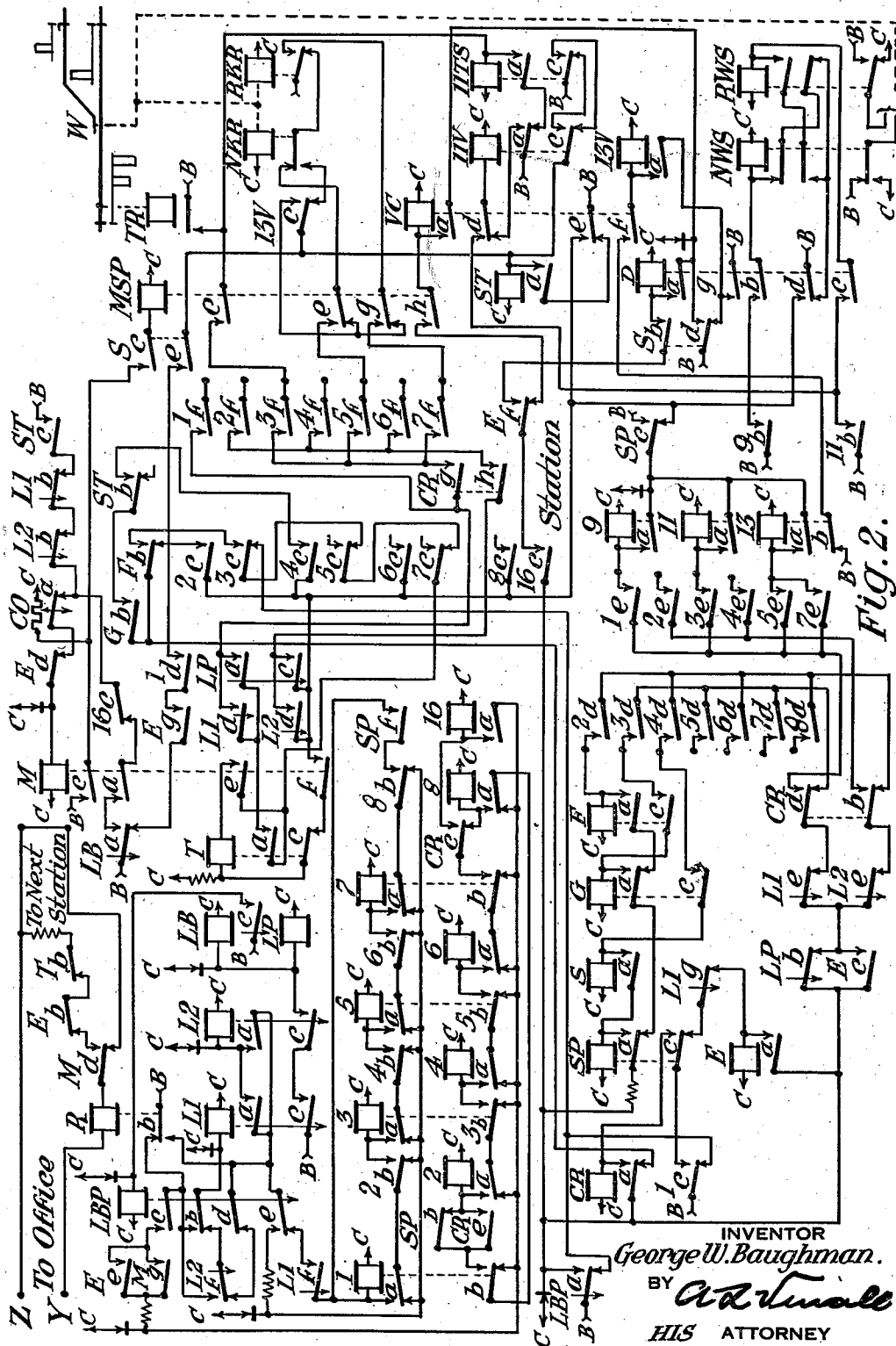


FIG. 2.

UNITED STATES PATENT OFFICE

2,396,812

REMOTE-CONTROL SYSTEM

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5 Claims. (Cl. 177—353)

My invention relates to remote control systems for the control from a central office of selected devices located at remote stations, and for also indicating at the office the condition of such devices and of other devices located at the stations. More particularly, my invention relates to centralized traffic control systems for railroads in which traffic governing devices distributed along a stretch of track are controlled from time to time by means of impulse codes transmitted over a line circuit and in which the same line circuit is used at other times to indicate the positions of the traffic governing devices and to indicate the presence and movement of trains through the stretch.

My invention is an improvement upon that disclosed in Letters Patent of the United States No. 2,229,249, granted January 21, 1941, to L. V. Lewis for Remote control systems.

In systems of this character it is the practice to provide coding units at the office and at the several stations which are arranged to deliver codes to the line circuit only when the line is free, and to provide lockout means so that only one coding unit remains in control of the line when two or more initiate codes at the same time. It is also the practice to employ composite codes in which the code elements are arranged in two groups, those of the first group being arranged in a distinctive pattern to provide a code call identifying a selected location, and the second group providing means for controlling a plurality of devices at that location in the same code. More particularly, in each control code transmitted from the office, the first group of elements operates a selector relay at the selected station, while a selector relay at the office operated at the same time places the coding unit under the control of a group of levers contained in an individual panel for that station which govern the character of the second group of elements in the code to control a group of traffic governing devices at the selected station. In an indication code the selector relay by which the office coding unit is associated with the control panel for the transmitting station is operated by the first group of elements to render the second group of elements of the code effective to control a plurality of indication lamps mounted on that panel to indicate the condition of each of a plurality of movable devices at that station.

Such indication codes are initiated automatically in response to a change in condition of any one of the movable devices. For example, the system may be arranged to initiate a code in response to the release of a track relay by a train

passing the station or as a result of a change in the position of a track switch or in the condition of the signals which govern traffic movements over the switch due to the reception of a control code from the office.

It is sometimes desirable to verify the condition of the station devices without changing their condition, particularly after the system has been idle for a time, due to a fault. In the patented system referred to, this is accomplished by the provision of an individual starting key or push button for each office panel by which control codes may be initiated without moving any of the control levers of the panel, and by arranging the station coding units so that an indication code will be initiated in response to each control code received even though no change is effected in the position of any of the controlled devices.

One object of the present invention is to provide an improved arrangement by which the operator may effect the initiation of indication codes by the coding units at one or more selected stations more rapidly, that is to say, without transmitting idle control elements of the second group to any of the stations thereby materially shortening the time the line circuit is in use. A special recall button is provided, which, if operated along with the individual starting button by means of which the code call is selected and the code initiated, causes the transmission of a special recall code containing only the first group of elements constituting the station code call. The station apparatus is correspondingly modified so that an indication code will be initiated in response to the operation of the station selector relay provided the code is terminated on the step following the group constituting the station code call, but will not be initiated in response to a normal control code including the second group of elements except as the result of a change in condition of one of the controlled devices.

In practice the arrangement used heretofore in which each control code is followed immediately by an indication code results under certain conditions in the transmission of two indication codes following a control code, as, for example, when there is some delay in the response of the controlled device. This condition is avoided in the present improvement, which thereby effects a further saving in the time the line is in use.

Another feature of the present invention relates to the provision of a general recall button by means of which the operator may transmit a code comprising a single group of elements of such a character as to operate the selecting relays at

all stations, thereby causing the transmission of an indication code from each station in turn by the transmission of but one recall code.

Other objects, purposes and features of my invention will be pointed out as the description proceeds.

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

Referring to the accompanying drawings, Fig. 1 shows the office equipment for a suitable centralized traffic control system arranged to include the recall code transmitting apparatus of my invention, and Fig. 2 shows the corresponding equipment employed at each field station.

Similar reference characters refer to similar parts in both views.

The system chosen to illustrate my invention is that of the Patent No. 2,229,249, hereinbefore referred to, the circuits of Fig. 1 corresponding to those of Figs. 1 to 5, inclusive, of the patent, in condensed form, but modified in certain particulars as hereinafter pointed out in detail, and also including a special recall button RCB and relay RCR, and a general recall button GB and relay GRR, arranged in accordance with my invention. The circuits of Fig. 2 correspond to those of Figs. 6 to 9 of the patent in condensed form and correspondingly modified, including arrangements by which the station starting relay ST of Fig. 2 may be operated by manual control from the office by the transmission of either a special or a general recall code. The circuits of the patent by which this relay is rendered responsive to a normal control code are not used.

As shown herein, the system employs control codes of sixteen steps, whereas in the patent the control codes terminate with the fourteenth step. The present arrangement provides for the control of two additional devices in each code, as has been found desirable. Each indication code comprises sixteen steps, as in the patent.

The mode of operation of the system of Patent No. 2,229,249 in the form shown herein will now be briefly described.

It will be understood that the office and stations are connected by a normally energized line circuit arranged as in Fig. 10 of the patent, including the office battery 80 and line relay OR, and the line relay R at each station, all in series. The codes are generated by periodically interrupting the line circuit by the operation of a transmitter relay OT or T, under the control of an associated master relay OM or M, both the open and closed periods of line current constituting code elements. The first group of elements in each code includes eight steps. In each control code the first step is a relatively long line open element to which a delivery control relay E at each station is selectively responsive, the code being thereby distinguished from an indication code in which the first step is relatively short. The remaining seven steps of the first group are arranged in each code in a combination of three long and four short steps to provide a distinctive code call. Each code call is identified by a three digit number in which the digits designate the long steps in the group of seven, there being a maximum of thirty-five such code calls, each of which is adapted to selectively control a series of three selector relays F, G and S at the selected station together with a corresponding series of relays such as the relays 2F, 23G and 234S, at the office.

The system may therefore include thirty-five

stations each arranged like Fig. 2 but responsive to a different code call, and the office apparatus is to be understood to include thirty-five control panels each having a starting button SK for manually controlling an individual starting relay, of which but one is shown, namely, relay 234ST, for effecting the transmission of the code call 234.

The transmission and reception of each code is governed by counting and timing relays in each coding unit, corresponding relays operating in unison at the office and stations. Referring to Fig. 1, the counting relays O1 to O8 respond successively to the eight elements of the first group, and then relays O1 to O7 are operated through a second cycle in response to the elements of the second group, relay O16 responding in place of relay O8 on the sixteenth step during which the apparatus is restored to its normal at rest condition.

The timing relays OL1, OL2, OLP, OLB and OLBP are all normally deenergized; the closing of the back contacts b of relays OL1 and OL2 indicating that the system is in its normal at rest condition and providing a circuit for energizing the master relay OM to initiate a code.

When relay OR releases on the first step of a code, the timing relays pick up in the order listed above, and relays OL2 and OLBP transfer the energizing circuit for relay OL1 from the back contact to the front contact b of relay OR. Relays OL1 and OL2 are then energized alternately in response to the periodic operation of relay OR, relay OL1 releasing to register the long odd-numbered steps of the code and relay OL2 releasing to register the long even-numbered steps of the code, while the repeating relay OLP controlled by these relays governs the length of the long elements in a code generated by the associated transmitter relay OT. Relay OLB and its repeating relay OLBP are bridging relays which remain picked up for the duration of a code, and serve to close various local circuits at the beginning of a code and to open them when the periodic operation of relay OR ceases.

To initiate a control code for transmission to the station having the code call 234, for example, the operator presses the starting button SK of the corresponding panel to pick up the starting relay 234ST associated with that panel, thereby energizing relay OM, if the system is in its normal at rest condition, over the circuit extending to terminal B of the local source of current at contact c of relay 234ST. Relay OM by closing its front contact e completes a pulsing circuit for relay OT extending to terminal B over back contacts c of the counting relays O1, O3, O5 and O7, by means of which relay OT is operated periodically to generate the short steps of the code, and relay OT picks up opening the line circuit to release relay OR and thereby pick up the timing relays and also relays O1, OE and MEP. The closing of contact f of relay O1 completes a stick circuit for relay OT including front contacts d of relay OL1 and a of relay OLP, in parallel, whereby a long first element is generated, relay OT holding the line open until relays OL1 and OLP release.

When relay OT releases to begin the second step, relay OR picks up, energizing relays O2, OL1 and OLP and deenergizing relays O1 and OL2. Relay O1 upon releasing completes the pulsing circuit for relay OT, but relay OT remains released to generate a long second step as required for the code call 234 due to the fact that its wind-

ing is short circuited by a connection from terminal B over contacts c of relays 234ST and O2 to its left-hand terminal, consequently relays OL2 and OLP release. Relay 2F becomes energized over a circuit including back contact e of relay OL2 and back contact b of relay OLP, the opening of back contact j of relay 2F removing the short circuit to allow relay OT to pick up to terminate the second step. Relay 2F completes a circuit for energizing its repeating relay OFF which in turn releases relays OE and MEP.

When relay OT picks up to begin the third step relay OR releases and relays O3, OL2 and OLP pick up, relays O2 and OL1 becoming deenergized. Relay OT is held energized to generate the long third step over a stick circuit including front contact c of relay O3 and front contact j of relay 2F. Relay 23G becomes energized in response to the release of relays OL1 and OLP, and the opening of back contact j of relay 23G allows relay OT to release. Relay 23G completes a circuit for energizing relay OGP, which in turn releases relays 2F and OFF.

When relay OT releases to begin the fourth step, relay OR picks up, energizing relays O4, OL1 and OLP, and deenergizing relays O3 and OL2. Relay O3 upon releasing completes the pulsing circuit for relay OT, but relay OT remains released to generate a long fourth step due to the fact that it is short circuited by a connection to terminal B over front contacts c of relays O4 and 234ST, consequently relays OL2 and OLP release. Relay 234S becomes energized and in turn releases relay 234ST, allowing relay OT to release. Relay 234S completes a circuit for energizing relay OSP, which releases relays 23G and OGP.

When relay OT picks up to begin the fifth step, relay OR releases, energizing relays O5, OL2 and OLP and releasing relay O4. Relay O5 opens the pulsing circuit for relay OT, which then releases, making the fifth step short, the release of relay OT energizing relay OR and releasing relay O5 to again pick up relay OT. This process continues through the eighth step, and since the front contact j of relay OSP is closed, relay O1 is operated on the ninth step. The closing of front contact c of relay O1 on the ninth step energizes the chain repeat relay OCR, which places relay OT under the control of contacts j of the counting relays to govern the character of the second group of elements in accordance with the positions of the levers of the panel selected by relay 234S, such as the switch lever 1WK. This lever, as shown, is effective in its normal position to make the ninth step long, and in its reverse position to make the eleventh step long. The operations continue in the manner described until the sixteenth step is reached, when relay O16 picks up, closing its front contact c to hold relay OT released so that relay OR remains steadily energized. Relays OL2, OLP, OLB and OLBP then release, relay OLB releasing relay OM, and relay OLBP releasing relays O16, 234S, OSP, OCR and OL1 to restore the apparatus to normal.

In response to the interruptions of the line current by relay OT, relay R and the timing relays at each station as well as the selecting relays and relays 1 to 8 operate in unison with the corresponding office relays. Relay E at each station is selectively energized by the closing of back contact g of relay L1 on the long first step. On the second step, relay F is energized at each station connected to respond to a code call of which

the first digit is 2. On the third step, relay F is energized at each station connected to respond to a code call of which the first digit is 3, likewise relay G at the station having the code call 234, relay G releasing relay F at that station. On the fourth step, relays F and G are picked up at certain stations along with relay S at the selected station, at which station relay S picks up relay SP and releases relay G.

Since the selected station is the only one at which relay SP is picked up, this is the only station at which the counting relays operate through the second cycle, and at which relay CR picks up on the ninth step.

At the selected station, relay CR conditions a group of register relays such as the relays 9, 11 and 13 of Fig. 2 to respond selectively to the long elements of the second group. Assuming that the ninth or eleventh step is long, relay 9 or 11 will become energized, and on the sixteenth step, a circuit is closed over front contacts of relays 16, E and S to pick up a delivery relay D to effect the energization of a normal or reverse switch control relay NWS or RWS in accordance with the character of the ninth and eleventh steps of the control code, to thereby control the track switch W at the selected station, in accordance with the position of its control lever 1WK.

The starting relay ST of the station coding unit is arranged to be picked up to initiate an indication code in response to a change in position of the switch W as reflected by the switch indication relays NKR and RKR and also in response to the release of the track relay TR due to the movement of a train into or out of the track section containing switch W.

The closing of front contact c of relay ST completes a circuit for the station master relay M provided the system is at rest, and relay M controls the generation of the code by the associated relay T in a manner generally similar to the operation of relay OT as above described. With the circuits as shown, the first group of elements of the indication code includes the code call 234 so that the station selector relay S and the office selector relay 234S are operated. At the transmitting station, the register relays such as 9, 11 and 13 are positioned in accordance with the character of the elements of the second group and on the sixteenth step a relay VC is operated to control relays 11V and 13V, etc. in accordance with the positions assumed by the corresponding register relays to open the circuits for relay ST if the elements of the second group correspond in character with the positions of the relays by which they are controlled, as explained more fully in Patent No. 2,229,249.

At the office a group of register relays such as O11, O13, O15 are operated in accordance with the character of the received elements of the second group and on the sixteenth step a delivery relay such as the relay 234D is energized to operate the group of indication relays K controlling the indication lamps E of the selected panel, in accordance with the positions of the register relays, all of which is fully described in the patent.

Considering now the operation of the special recall button RCB of my invention, it will be assumed that the operator desires to recall the indications from a particular station such as the one having the code call 234.

To initiate the special recall code, the operator presses the recall button RCB and also presses the starting button SK for the selected panel,

thereby picking up the starting relay 234ST and the master relay OM in turn, as in the case of a normal control code as hereinbefore described.

When relay OM picks up, a circuit is closed from terminal B at its front contact *c* over the contact of the button RCB through the winding of relay RCR to terminal C. Relay RCR picks up, and when relay OLBP picks up on the first step, a stick circuit is closed from terminal B at contact *f* of relay OLBP over the front contact *a* and winding of relay RCR to terminal C, and button RCB may then be released.

The transmission of the first group of elements is effected in the same manner as in a normal control code as hereinbefore described, relay 234S at the office and relay S at the selected station becoming energized, but on the ninth step relay OI fails to pick up, due to the fact that its circuit includes back contact *b* of relay RCR, which is now open. Consequently, on the ninth step, relay OT is held energized over its pulsing circuit, and relay OR remains released, releasing relays O8, OLI, OLP, OLB, OM and OT, thereby closing the line circuit after a time which is materially longer than any long element in a code. Relays OR, OLI, OLP and OLB pick up and then relays OL2, OLP, OLB and OLBP release in the normal order, relay OLBP releasing relays RCR, 234S, OSP and OLI to restore the apparatus to normal.

At the selected station, the operations continue through the first eight steps as in a normal control code and relay I picks up on the ninth step, relay R remaining released on this step long enough to release relays LI, LP and LB, while relays CR and 9 will become energized. The release of relay LB completes a circuit from terminal B at its back contact *a* over front contact *d* of relay I, front contact *g* of relay E and front contact *e* of relay S through relay ST to terminal C. Relay ST picks up, completing its usual stick circuit extending to terminal B at back contact *e* of relay VC, and is thus placed in condition to initiate an indication code as soon as the line becomes free.

When relay R picks up in response to the release of relay OT at the end of this extra long ninth step, relays 2, LI, LP and LB become reenergized and then relays I, L2, LP, LB and LBP release in order, relay LBP releasing relays 2, 9, CR, E, S, SP and LI to restore the apparatus to normal.

The ninth step therefore is effective to pick up relay ST and constitutes the delivery step of the recall code, but since this is a line open step, an additional step is necessary in order to restore the line circuit to normal. Nevertheless, the recall code is materially shorter than a normal control code, and its reception at the selected station does not result in the operation of the delivery relay D nor of the stick relays such as the relays NWS and RWS controlled thereby.

I shall next assume that the operator desires to recall indications from all stations, and accordingly presses the general recall button GB. If the system is in its normal at rest condition the closing of the contact of button GB will complete a circuit from terminal B over back contacts *g* of relays OLI and OL2 to pick up the general recall stick relay GRR which relay, by closing its front contact completes a circuit to pick up relay OM and thereby initiate the delivery of a code in the manner hereinbefore described, the closing of front contact *a* of relay OLB completing a stick circuit for relays GRR and OM where-

upon the button GB may be released. The closing of front contacts *c* and *d* of relay GRR connects terminal B directly to the circuits for relay OT including the front contact *a* and *c* of relay OLP by means of which the long steps of the code are generated, consequently, this general recall code will consist of a series of long steps. That is to say, to generate the odd-numbered steps of the general recall code, relay OT is picked up over its pulsing circuit including the back contacts *c* of the odd-numbered counting relays and held energized over a stick circuit after one of these relays picks up, which extends to terminal B at front contact *c* of relay GRR, the stick circuit being opened in response to the release of relays OLI and OLP. To generate the even-numbered steps, relay OT is held released after its pulsing circuit is closed, by a connection from terminal B at front contact *d* of relay GRR which short circuits the winding of relay OT until the connection is opened in response to the release of relays OL2 and OLP.

Back contact *b* of relay GRR opens the circuits for all the office selector relays so that these relays and likewise the repeating relays OE, OFP, OGP and OSP remain released.

The transmission of the general recall code continues as above described through eight long steps, but on the ninth step, relay OI remains released because its pick-up circuit is open at contact *f* of relay OSP. Relay OT is held steadily energized and relay OR remains released, releasing relays O8, OLI, OLP and OLB. Relay OLB releases relays OM and GRR, and relay OM releases relay OT, which therefore hold the line open for a time which is considerably longer than any of the long selecting elements. When relay OT releases, relay OR picks up, reenergizing relays OLI, OLP and OLB, and then relays OL2, OLP, OLB, OLBP and OLI release in the normal order to restore the apparatus to normal.

It will be readily apparent that the relays E, F, G and S and relay SP will respond at all stations to the general recall code of eight long steps, and that at each station relay I will pick up on the ninth step, energizing relay CR. Due to the fact that the transmission of the code has terminated, relay R will remain released on the ninth step long enough to release relays LI, LP and LB. The conditions at each station are now the same as at the selected station on the ninth step of the special recall code as above described, and it will be evident without further description that the ninth step of the general recall code serves as a delivery element to pick up the station starting relays at all stations, after which the apparatus is restored to its normal at rest condition in the usual manner, but without operating the delivery relay D nor the stick relays controlled thereby, at any station.

It will be seen therefore, that if the operator presses the general recall button momentarily at a time when the system is in its normal at rest condition, the effect of the resulting code will be to pick up the starting relays at all stations simultaneously. This general relay code will therefore be followed by an indication code from each station in turn, in a predetermined order, in the manner explained in Patent No. 2,229,249.

My invention is of particular utility in connection with the operation of fault detecting and locating apparatus, such for example as that of my Letters Patent of the United States No. 2,011,237, granted August 13, 1935, for Remote

control systems. In this patent a system is shown having a normally energized series line circuit like that shown herein. In the event of a broken line wire or the like, a fault relay is operated at each station to pick up a sectionalizing relay like the relay M shown herein. The coding units at the office and at the stations on the office side of the break may then be restored manually to operation by sending a special code to the nearest station to release the fault relay and thereby extend the closed portion of the line circuit to the next station, and by then sending a special code to that station, and so on until the restored portion of the line circuit includes all the stations on the office side of the break. It will be evident that if the normal control codes were effective to release the fault relay, any such code transmitted to the last station would cause the fault to reappear, and consequently a special code is required, the special recall code of the present invention being suitable, and also efficient for the purpose because of its relatively brief duration.

My recall codes have a further advantage in connection with the restoration of fault locating apparatus, in that they are incapable of changing the position of any of the traffic controlling devices at a station. This is not true of a normal control code, nor of a special code containing traffic control elements. In the event of a fault, it may be assumed that the operator will lack information as to recent train movements, and if a control code is used to restore a station to operation at which a signal was at clear when the fault developed, he will not know whether to send a signal clear code to avoid putting the signal to stop in the face of an approaching train, or to send a signal stop code to avoid clearing the signal improperly for a second train, on the assumption that the signal has already been put to stop automatically by a first train. This difficulty is overcome by my invention, as will readily be apparent.

My invention is also of a particular utility in connection with fault detecting and locating apparatus such as that of my copending application, Serial No. 468,224, filed December 8, 1942, for Remote control systems, which is applicable to bridged line circuit systems such as that shown in Letters Patent of the United States No. 2,303,875, issued December 1, 1942, to G. W. Baughman and N. F. Agnew, for Remote control systems.

In systems of this type the line relays and transmitting contacts are connected in parallel, and the system may become incapacitated due to a short circuit in a transmitter, or due to the continued transmission of incomplete codes, for example. The apparatus to which I refer includes a normally energized fault relay at each station which may be operated manually by opening the line circuit at the office for a time, the operation of each fault relay serving to isolate the associated transmitter from the line without disconnecting the associated line relay. The fault is thereby cleared as far as the line circuit is concerned, this generally resulting in the restoration of the receiving apparatus at all stations, or at least at those stations at which no fault exists, to an operative condition, and the transmitter at each such station may then be restored to normal by the transmission of a code to that station to pick up the fault relay. In my prior application the fault relay is picked up by the operation of the station delivery relay D, but for reasons ex-

plained above, it is preferable to pick it up selectively by a code containing no other control elements. This may be readily accomplished by the provision of an energizing circuit for picking up the fault relay similar to the one shown herein for picking up relay ST by a recall code, in place of one controlled by relay D, as will be obvious, thereby rendering the fault relay selectively responsive to the special and general recall codes of the present invention and attaining the advantages mentioned.

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 a remote control system, an office and a plurality of stations, a code transmitter at the office for transmitting different control codes to said stations each comprising a first group of elements adapted to select a station and a second group of elements for operating movable devices at the selected station, manually controllable recall means at the office for at times interrupting the transmission of a code following the selection of a station and prior to the operation of any of said movable devices, a code transmitter at each station for transmitting indication codes to the office for indicating the condition of said movable devices, and starting means at each station for initiating the operation of the associated transmitter in response to a change in the condition of any of the movable devices at such station and also in response to said interrupted code, provided the interrupted code includes selecting elements to which such station is selectively responsive.

2. In a remote control system, an office and a plurality of stations, a code transmitter at the office for transmitting different control codes to said stations each comprising a first group of elements for selecting a station and a second group of elements for operating movable devices at the selected station, a chain of counting relays at the office operable through a first cycle to govern the transmission of the station selecting elements and through a second cycle to govern the transmission of the elements for controlling said movable devices, manually controllable recall means at the office for at times rendering the counting relays operable through said first cycle only to interrupt the code following the selection of a station but prior to the operation of any of said movable devices, a code transmitter at each station for transmitting indication codes to the office for indicating the condition of movable devices at such station, and means at each station selectively responsive to the interruption of a code following the reception of selecting elements to which such station is selectively responsive for initiating the operation of the code transmitter at such station.

3. In a remote control system, an office and a plurality of stations, a plurality of movable devices at each station, a code transmitter at the office for transmitting different codes to said stations, each containing a distinctive code call, a plurality of starting buttons including one for each code call, a recall button, means responsive to the operation of any starting button when the recall button is not operated for setting the transmitter into operation to transmit a code including the code call identifying the operated starting button followed by a group of elements for operat-

ing the movable devices at a selected station, means responsive to the operation of any starting button when said recall button is also operated for setting the transmitter into operation to transmit a code including the code call identifying the operated starting button followed by a single delivery element in place of said group of elements, a selector relay at each station each responsive to a different code call, means including a starting relay at each station for indicating at the office the condition of the movable devices at such station, and means controlled by each selector relay for conditioning the movable devices at that station for operation in accordance with the character of said group of elements when such elements are included in a code to which such selector relay is responsive and for operating the associated starting relay only, when said single delivery element replaces said group of elements in a code to which said selector relay is responsive.

4. In a remote control system, an office and a station connected by a line circuit, coding units at the office and station each including a transmitting relay for delivering codes to the line circuit, a starting relay for initiating its operation, a line relay responsive to the codes delivered to said line circuit, and a chain of counting relays for controlling the operation of the associated transmitter relay, said counting relays being operable through a cycle in which a different chain relay responds to each of a series of operations of the line relay, each coding unit also including a series of selector relays arranged to be operated during a first cycle of the chain relays, with a circuit dependent upon the energization of said selector relays for energizing the first relay of the chain next in order after the last relay of the chain to initiate a second cycle of operation of said relays; a plurality of movable devices at the station; means controlled by the selector relays for controlling said movable devices in accordance with the code

delivered by the office transmitter during the second cycle of operation of the chain relays, manually operable recall means at the office effective when operated to interrupt the delivery of a code by the office transmitter upon the completion of the first cycle of operation of the office counting relays, and means controlled by the station selector relays and first chain relay for operating the station starting relay in response to said interrupted code.

5. In a remote control system, an office and a plurality of stations connected by a line circuit, a code transmitter at the office and at each station for delivering different codes of time spaced elements to said line circuit, a selector relay at each station selectively responsive to a combination of elements of a given character in a control code delivered by the office transmitter when said elements are arranged in a particular pattern in such code constituting a code call for such station, means controlled by each selector relay for controlling movable devices in accordance with the character of additional elements in the code to which such relay responds, means controlled by the selector relay at each station when operated for initiating the operation of the associated transmitter to deliver an indication code to the line circuit for indicating at the office the condition of movable devices at such station, a manually operable general recall button at the office, means including said button for transmitting a recall code over said line circuit comprising a series of elements all of which are of said given character to operate the selector relays at all stations, and means for interrupting such code without transmitting additional elements to render such code effective to initiate the transmission of indication codes from all stations without operating the movable devices at any station.

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