April 13, 1948. W. W. SEITZ 2,439,676

INTERLOCKING LINE-CIRCUIT RAILWAY TRAFFIC CONTROLLING APPARATUS

Filed Sept. 6, 1945 3 Sheets-Sheet 1

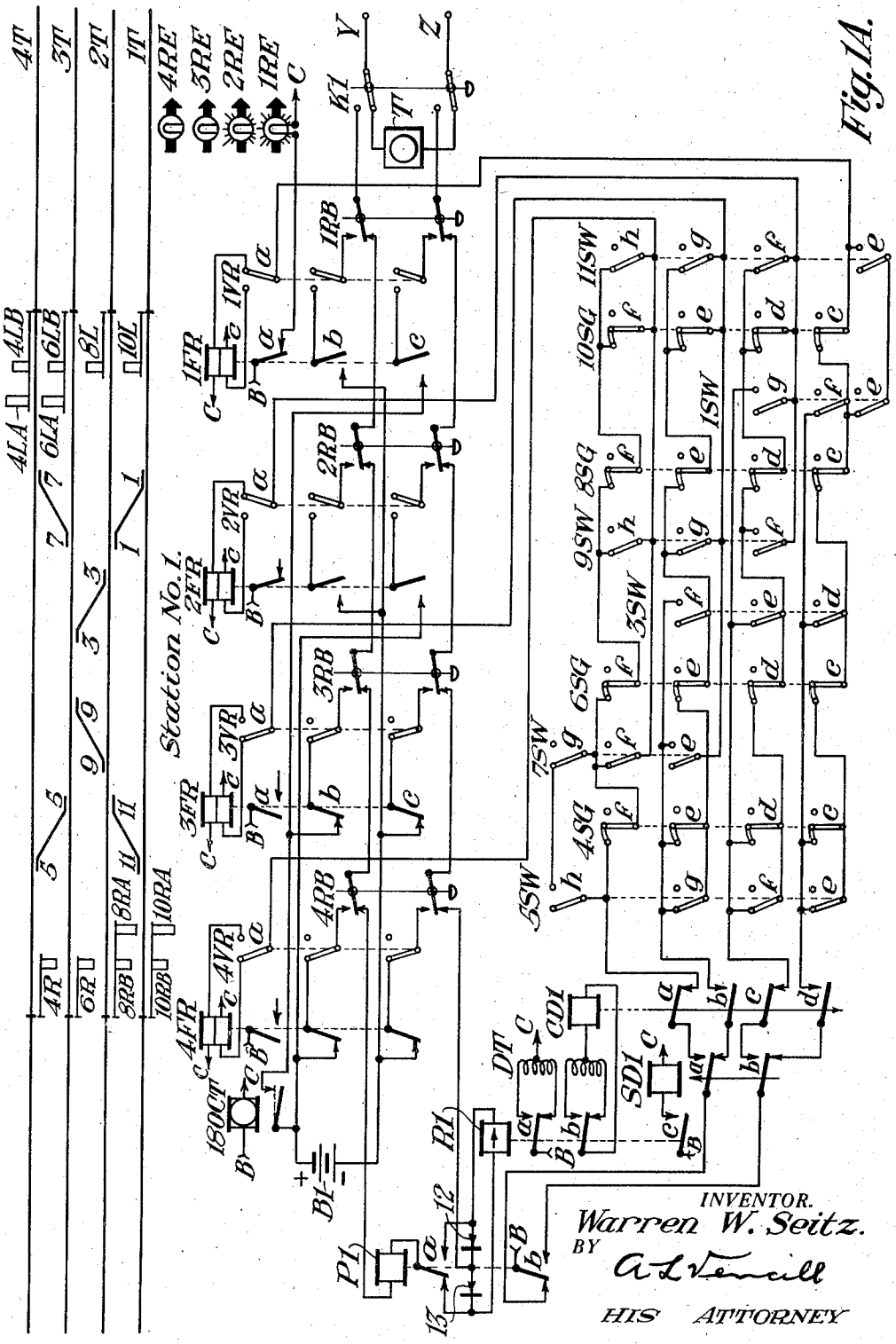


Fig. 1A.

INVENTOR.
Warren W. Seitz.
BY
A. L. Vencill
HIS ATTORNEY

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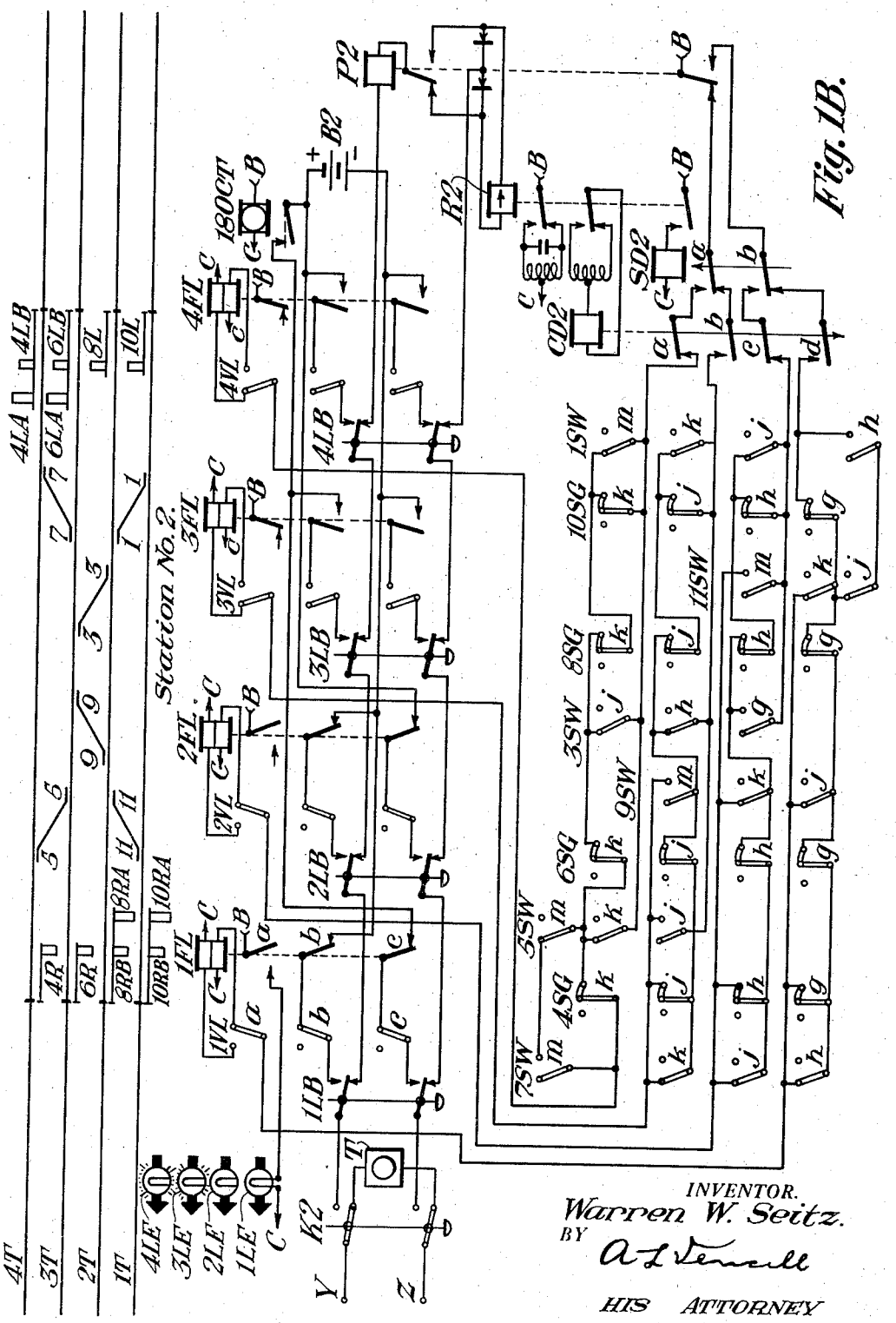


Fig. 1B.

INVENTOR.
Warren W. Seitz.
BY
A. L. Terrell
HIS ATTORNEY

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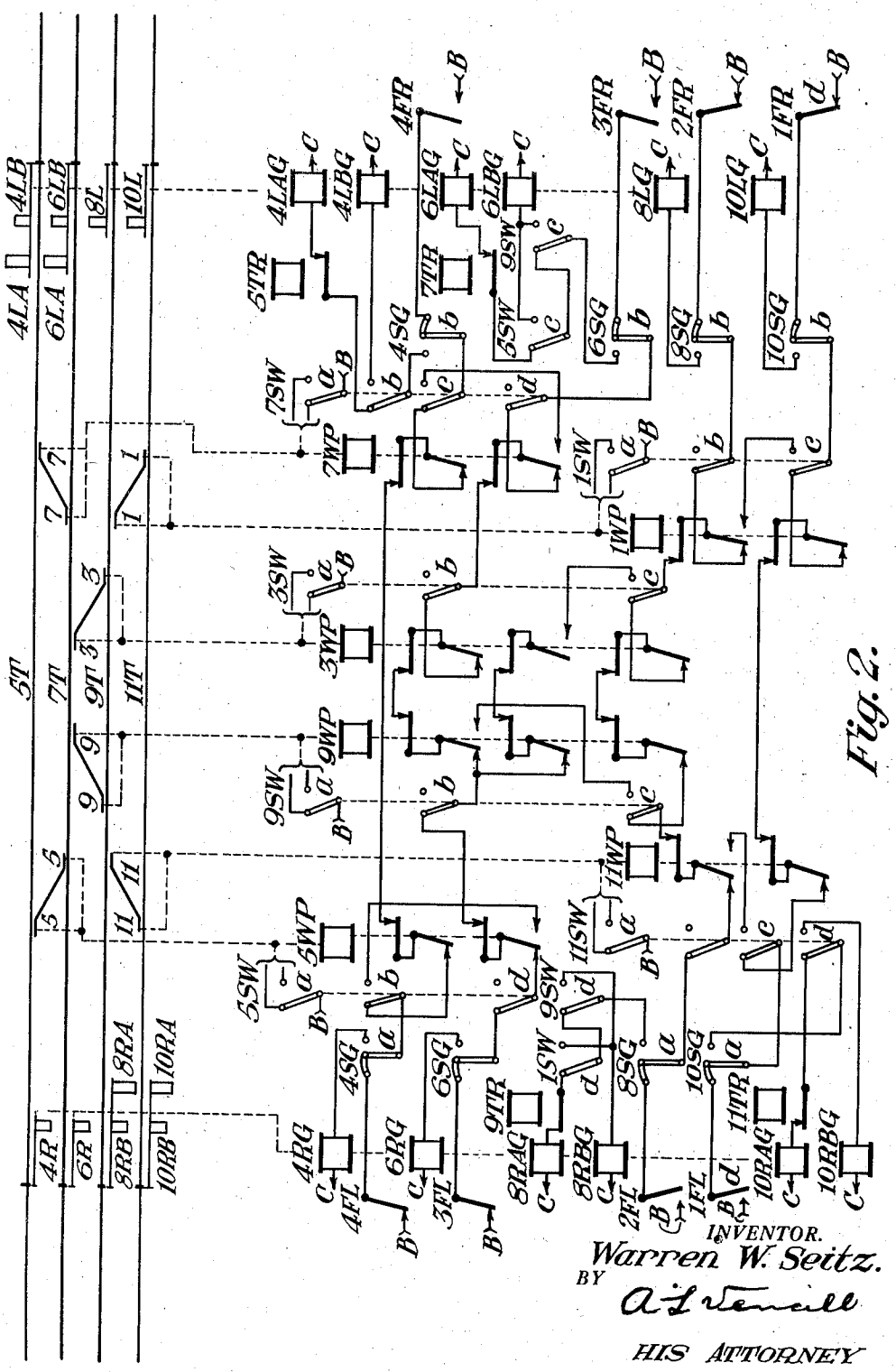


Fig. 2.

INVENTOR.
Warren W. Seitz.
BY
A. L. Terrill
HIS ATTORNEY

Patented Apr. 13, 1948

2,439,676

UNITED STATES PATENT OFFICE

2,439,676

INTERLOCKING LINE-CIRCUIT RAILWAY TRAFFIC CONTROLLING APPARATUS

Warren W. Seitz, Wilkinsburg, Pa., assignor to The Union Switch and Signal Company, Swissvale, Pa., a corporation of Pennsylvania

Application September 6, 1945, Serial No. 614,674

9 Claims. (Cl. 246—134)

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My invention relates to railway traffic controlling apparatus, and more particularly to traffic direction locking apparatus for the control of traffic movements between two block stations or interlocking plants on a multiple track railroad.

One object of my invention is to prevent the operator at either of two stations connected by a plurality of tracks from clearing any signal which governs traffic movements into any route leading to the other station unless the corresponding traffic direction for traffic movements in that route has been set up by the joint action of the operators at the two stations.

Another object of my invention is the provision of a unitary set of traffic direction locking apparatus of this character for controlling the direction of traffic movements over each of a plurality of stretches of track extending between two stations, which is controllable over a single pair of line wires, such as a telephone line connecting the stations, by means of distinctive code signals or impulses of different characters.

In its specific embodiment as shown herein, the apparatus of my invention includes a two position traffic lever, a push button, and a traffic relay of the stick polar type at each of the two stations, for each stretch of track connecting the stations, together with suitable selecting apparatus by means of which each of the traffic relays may be operated to a position corresponding to that of the associated traffic lever by a distinctive code signal transmitted over the line wires, when the push button at the other station for the corresponding stretch of track is operated. Each traffic relay in one position designates the adjacent end of the corresponding stretch as the entrance end, and closes a contact in the circuits for the signals at that end which govern traffic movements into the stretch. The corresponding traffic relay at the other end of that stretch of track in a similar position designates its end as the exit end of the stretch, and in this position the relay closes a contact in the circuit governed by the associated push button by means of which the first mentioned relay may be operated by its lever under suitable traffic directions in order to reverse the direction of traffic.

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

In the accompanying drawings, Figs. 1A and 1B, taken together, illustrate the traffic locking apparatus of my invention as applied to the control over a pair of line wires Y and Z of the traffic direction on each of the four tracks of a four-track railroad.

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The territory controlled by one set of this apparatus is to be understood to be that shown in the track plan which extends across the upper portions of Figs. 1A and 1B, comprising the tracks of two interlocking plants at locations identified as "station No. 1" and "station No. 2," respectively, together with the intervening stretch comprising the main tracks 1T, 2T, 3T, and 4T. The two interlocking plants are assumed to be similar, each including a series of crossover switches identified by the numbers 1, 3, 5, 7, 9, and 11, together with a plurality of signals for governing traffic movements in both directions over the routes formed by the switches.

Fig. 2 shows circuits which may be employed at each interlocking plant to govern the mechanisms for the signals at that plant. The signals are identified by the numbers 4, 6, 8, and 10, with a suffix R or L to indicate that the direction of traffic movement governed thereby is toward the right or left, respectively, while the operating mechanisms for the signals are identified by the reference character G following the signal designations. The circuits shown in Fig. 2 are adapted for use at an interlocking plant located at a station where the signals governing traffic movements in both directions are controlled by traffic locking apparatus of the type shown in Figs. 1A and 1B.

When but one set of traffic locking apparatus is to be considered, this is arranged as shown by placing Fig. 1A at the left of Fig. 1B and by employing circuits shown in Fig. 2 at the stations at both ends of the stretch. In this arrangement, the signal circuits at station No. 1, Fig. 1A, are those for the signals R in Fig. 2, which include contacts of the traffic relays 1FR—4FR of Fig. 1A, while the signal circuits at station No. 2, Fig. 1B, are those for the signals L in Fig. 2 which include contacts of the traffic relays 1FL—4FL of Fig. 1B.

It will be understood that other sets of traffic locking apparatus similar to the one shown in Figs. 1A and 1B may be used to control traffic movements in the stretches at the left of station No. 1 and at the right of station No. 2, in which case the traffic locking apparatus at each intermediate station will include that of both Figs. 1A and 1B, controlled over line wires extending in opposite directions, as well as that of Fig. 2 in its entirety. That is, when the circuits for the signals for both directions at a station are controlled by traffic relays FR and FL, it is to be

understood that these relays belong to different sets of the traffic locking apparatus of Figs. 1A and 1B.

Similar reference characters refer to similar parts in each of the views, and to simplify the drawings, in lieu of showing the local sources of current for energizing the various relays, I have shown only their terminals, the reference character B identifying the positive or supply terminal and C the negative or common return terminal, in each instance.

Referring to Fig. 2, each station is assumed to contain an interlocking machine of the conventional locked lever type for the local control of the switches and signals at that station, such for example, as is shown and described in the book "Electro-Pneumatic Interlocking," published November 1914, by The Union Switch and Signal Company, Swissvale, Pa. For an understanding of my invention it is deemed sufficient to point out that the interlocking machine at each station includes a two position switch lever SW for each single switch or crossover, such as the lever 1SW for the crossover switches 1, for example, to which is attached a multiple contact circuit controller. As indicated diagrammatically by a dotted line connection in Fig. 2, contact *a* of the switch lever 1SW controls circuits for governing the power operation of the crossover switches 1 so that the switches have assumed their normal position as shown when lever 1SW occupies its normal or left-hand position, and have assumed their reverse position as required for a train movement from one main track to another when the switch lever is reversed. Each crossover switch controls the usual switch indication relay such as the relay 1WP, which reflects the position of both switches of the crossover and its contacts jointly with contacts of the associated switch lever such as the contacts *b* and *c* of relay 1SW are included in route circuits over which the signals which govern traffic movements over that crossover are controlled. Each switch lever at station No. 1 has additional contacts such as the contacts *e*, *f* and *g* of lever 1SW shown in Fig. 1A included in a locking circuit network for controlling the traffic relays FR, while at station No. 2, other switch lever contacts, such as the contacts *h*, *j*, *k*, and *m* of the lever 1SW at that station are included in a similar but oppositely directed locking circuit network for controlling the traffic relays FL. Each signal is provided with an operating mechanism shown in Figure 2 and identified by the reference character G prefixed by the designation of the signal as marked on the track diagram, such as the mechanisms 10RAG and 10LG for signals 10RA and 10L, respectively, the clearing of each signal being effected by energizing its mechanism over a route circuit in Fig. 2 established by the switch levers SW and indication relays WP. Each route circuit for a signal which governs traffic movements toward another interlocking plant connected by the direction locking apparatus of my invention, also includes a contact *d* of a traffic relay FR or FL as shown. Each group of signals bearing the same numerical prefix is governed by a circuit controller attached to a correspondingly numbered three position signal lever SG. Each signal lever, such as lever 10SG, for example, normally stands in a center position as shown, from which it may be operated to the right to energize the signal mechanism 10 RAG or 10RBG by completing a circuit over the right-hand lever contact *a*, or it may be operated to the left to energize mechanism

10LG for the opposing signal 10L by completing a circuit over the left-hand contact *b* of lever 10SG.

The circuit for signal 10RA at station No. 1, for example, extends from terminal B at contact *d* of relay 1FR over contact *b* of lever 10SG, normal contact *c* of lever 1SW, the neutral and normal polar contacts of relays 1WP and 11WP, normal contact *c* of lever 11SW, right hand contact *a* of lever 10SG, contact *d* of lever 11SW and a front contact of the track relay 11TR for section 11T and thence through the winding of mechanism 10RAG to terminal C.

Each signal lever at station No. 1 has additional contacts such as the contacts *c*, *d*, *e* and *f* of lever 10SG, in the locking circuits for the relays FR in Fig. 1A, while at station No. 2, the corresponding signal lever has other contacts such as contacts *g*, *h*, *j* and *k* of lever 10SG, shown in Fig. 1B, in the locking circuits for the relays FL.

It will be understood that the switch and signal levers are interlocked mechanically and also electrically, at times, by means of lock magnets in the conventional manner as described in the book referred to, and that the positions of the switches and signals are indicated by the positions of their respective levers. That is to say, the lock magnet for each switch lever prevents its movement to the full normal position as shown herein except when the switches controlled thereby are locked in their normal position, and the lock magnet for each signal lever prevents its return to the normal position as shown except when all of the signals controlled by such lever stand at stop.

Referring now to Figs. 1A and 1B, the traffic locking apparatus at station No. 1 includes a line battery B1, a code transmiter 180CT for interrupting the current delivered by battery B1 at the rate of 180 times per minute, and a set of four push buttons 1RB—4RB, one for each of the four tracks 1T—4T, by means of which current of one of four distinctive characters, positive or negative, steady or interrupted, may be supplied from battery B1 to the line wires Y and Z to permit the corresponding one of the four traffic relays 1FL—4FL at station No. 2, at the right, to be operated to a position determined by that of the corresponding one of the four traffic levers 1VL—4VL, provided first that the block telephones T which are normally connected to the line wires Y and Z are disconnected therefrom by the operation of keys K1 and K2. Station No. 2 is provided with a similar line battery B2 and code transmitter 180CT, and with a set of four push buttons 1LB—4LB for supplying positive or negative, steady or interrupted current from battery B2 to the line wires Y and Z extending to the left, to selectively control the traffic relays 1FR—4FR at station No. 1, in accordance with the positions of levers 1VR—4VR. The decoding apparatus by which the traffic relays are rendered selectively responsive to the currents of different character is similar at the two stations, and by reference to Fig. 1A it will be seen that this includes a polar stick relay P1 and a biased polar relay R1, which by the operation of key K1, are connected in series across line wires Y and Z over the normally closed contacts of each of the push buttons 1RB—4RB. These relays function like the similar relays shown in Letters Patent of the United States No. 2,324,200, issued July 13, 1943, to A. E. Dodd, that is, when wire Y is positive, relay P1 closes its lefthand contact *a* and current from wire Y flows from left to right through relay R1 and rectifier 12 to wire Z to

cause relay R1 to assume its energized position. If on the other hand, wire Z is made positive, relay P1 is energized reverse through rectifier 13 and operates its contact *a* to the right to complete a circuit over which current from wire Z flows through rectifier 13 and from left to right through relay R1. It follows that relay R1 responds to either polarity of current supplied to wires Y and Z, but only when relay P1 assumes a position in accordance with the polarity. In the event relay R1 is operated periodically by interrupted current, its contact *a* supplies impulses of alternately opposite polarity to the upper or primary winding of a decoding transformer DT, thereby inducing similar impulses in its lower or secondary winding which are rectified by contact *b* of relay R1 and supplied to a code detector relay CD1. The latter therefore responds selectively to the periodic operation of relay R1 as occurs when a contact of relay 180CT at the distant station is included in its circuit. When relay R1 is energized, its contact *c* supplies current to a relay SD1, which relay is of the slow pick-up, quick release type requiring a steady energization for about one second before it assumes its energized position. Relay SD1 remains in its released position when relay R1 is operated periodically as described, and therefore is selectively responsive to steady current received over wires Y—Z.

Each of the relays 1FR—4FR is controlled over a circuit including contact *a* of the corresponding traffic lever 1VR—4VR, and a distinctive combination of the contacts of relays P1, CD1 and SD1, the circuit for each relay FR also including one or more circuit portions in a locking circuit network which as shown includes contacts of the switch and signal levers of Fig. 2. Assuming that the locking circuits provide a circuit path for each of the traffic relays, it will be seen that with wire Y negative, relay 1FR is energized if interrupted current is supplied and relay 2FR is energized if steady current is supplied from station No. 2. When wire Y is positive, relay 3FR is energized if interrupted current is supplied and relay 4FR is energized if steady current is supplied from station No. 2.

It will also be seen that when any one of the push buttons associated with the traffic levers is operated, the circuits for controlling the associated traffic relays are opened, and if the corresponding traffic relay and lever are both in their exit positions (this being the left-hand position in Fig. 1A and the right-hand position in Fig. 1B), current is supplied to line wires Y—Z over contacts *b* and *c* of the traffic relay FR or FL which is of the same character as that by which such relay is governed, to operate the corresponding relay FL or FR at the other station. In other words, the code signals have different characters which identify the traffic locking apparatus for the different tracks, and each set of apparatus employs code signals of the character assigned thereto, for both directions of transmission.

The locking circuit networks shown in Figs 1A and 1B are controlled by the levers in accordance with conditions within the limits of the respective interlocking plants, and their purpose is to prevent the operation of any traffic relay by its lever under conditions which would open the circuit for a signal which had been cleared by the operation of a signal lever. The traffic locking system is thus made to conform to the rule that signal circuits should be so designed that after a signal has been cleared it cannot be restored manually to stop by the operation of any lever

other than its control lever. Furthermore, the locking circuits provide means for preventing the reversal of traffic direction in any route connecting the stations except under the proper traffic conditions as reflected by the circuits at both stations.

By reference to Fig. 1A, it will be seen that the locking circuits include a separate group of circuits for each of the four traffic relays, and for relay 1FR, governing traffic movements over section 1T, a circuit branch is closed to render the relay responsive to the operation of the decoding apparatus and of the associated traffic lever 1VR, and thereby enable the direction of traffic movement in section 1T to be reversed, provided the entering signal is at stop, under each of the following conditions: First, when crossovers 11 and 1 are normal, signal 10RA is the entering signal for the route including section 1T, and if the signal lever 10SG is in its normal or left-hand position, indicating that signal 10RA is at stop, the circuit for relay 1FR may be closed over the circuit branch including contact *f* of lever 1SW and contact *c* of lever 10SG. Second, when crossover 11 is reversed and crossover 1 is normal, all routes extending to section 1T are blocked, lever 10SG is free to be operated to the right to clear signal 10RB for a movement into section 2T, and the circuit for relay 1FR may be closed over the circuit branch including contacts *e* of levers 1SW and 11SW. Third, when crossover 1 is reversed and crossovers 3 and 9 are normal, signal 8RB is the entering signal for the route including section 1T if crossover 11 is normal and signal 10RB is the entering signal if crossover 11 is reversed. In either case, if the signal levers 8SG and 10SG are in their normal or left-hand positions, the circuit for relay 1FR may be closed over the circuit branch including contact *d* of lever 3SW and contacts *c* of levers 8SG and 10SG. Fourth, when crossovers 1 and 3 are reversed, and crossovers 9 and 5 are normal, signal 6R becomes the entering signal for the route including section 1T and if this signal is at stop and levers 6SG, 8SG and 10SG are in their normal or left-hand positions, relay 1FR may be energized over the circuit branch including contact *e* of lever 5SW and contacts *c* of levers 6SG, 8SG and 10SG. Fifth, when crossovers 1, 3 and 5 are reversed and crossover 9 is normal, signal 4R becomes the entering signal for the route including section 1T, and if this signal is at stop and levers 4SG, 6SG, 8SG and 10SG are all in their normal or left-hand positions, relay 1FR may be energized over the circuit branch including contacts *c* of each of these levers.

The locking circuits for each of the relays 2FR, 3FR and 4FR function in a generally similar manner, and it is therefore deemed unnecessary to trace these circuits in detail. In each case the locking circuits serve to place the traffic relay under the control of the lever for the particular signal which governs traffic movements into the route leading to that one of the sections 1T—4T with which such traffic relay is associated.

In Fig. 1B, equivalent locking circuits are provided for each of the traffic relays 1FL—4FL, arranged for the opposite direction of traffic movements as required for the various routes at station No. 2 which lead into sections 1T—4T. For example, when switches 1 and 11 are normal, signal 10L is the entering signal for the route leading into section 1T and if the signal lever

10SG at station No. 2 is in its normal or right-hand position indicating that this signal is at stop, relay 1FL may be energized over the circuit branch including contact *k* of lever 11SW and contact *g* of lever 10SG. Each of the lock-ink circuits in Fig. 1A has its counterpart in Fig. 1B, the circuit branch just traced, for example, corresponding to the one in Fig. 1A which includes contact *f* of lever 1SW and contact *c* of lever 10SG, and in view of the similarity of these circuits to those of Fig. 1A it is believed that they will be readily understood from the drawings without further description.

The purpose of the traffic relays is to prevent either operator from clearing a signal for a route leading into any one of the sections 1T—4T in a direction contrary to that agreed upon. Considering the lower main track, for example, the traffic relays 1FR and 1FL normally both have their right-hand contacts closed designating the direction from left to right for movements over the stretch 1T, this being indicated at station No. 1 by the lighting of a directional indicator lamp 1RE over an obvious circuit, the corresponding lamp 1LE at station No. 2 being dark. At station No. 1, contact *d* of relay FR, shown in Fig. 2, is closed to connect terminal B to the circuit for the signal 4R, 6R, 8RB or 4RA, dependent upon the position of the track switches, which governs traffic movements into stretch 1T. Thus with switch levers 11SW and 1SW normal, as shown, by moving lever 10SG to the right to close its right-hand contact *a*, a circuit is closed through mechanism 10RAG to terminal C to clear signal 4RA, as may readily be traced from the drawing.

At station No. 2, contact *d* of relay 1FL is open. This prevents the clearing of that signal which governs traffic movements in the against-traffic direction into stretch 1T, if the operator at that station should inadvertently operate the signal lever therefor to its left-hand position. Thus, for example, if crossovers Nos. 1 and 11 at station No. 2 are normal, mechanism 10LG does not become energized in response to the closing of left-hand contact *b* of lever 10SG because terminal B is disconnected from the circuit by contact *d* of relay 1FL. When one or more of the crossovers is reversed, contact *d* of relay 1FL opens the circuit for signal 4LB, 6LB or 8L according to the route which leads to stretch 1T, as shown by Fig 2.

I shall now describe the operation of the traffic locking apparatus of my invention, starting with the assumption that the apparatus is in its normal condition as shown and that it is desired to reverse traffic in stretch 1T. The operators reverse the keys K1 and K2 to establish a battery circuit over the line wires Y and Z.

The operator at station No. 1 then places lever 1VR in its left-hand position while the operator at station No. 2 presses button 1LB for a brief interval corresponding to several cycles of operation of relay 180CT at that station, thereby supplying interrupted current of negative polarity to the line. The line circuit thereby established extends from the positive terminal of battery B2 over the contact of 180CT, Fig. 1B, contacts *c* of relay 1FL and of lever 1VL, contacts of keys 1LB and K2 to line Z, thence in Fig. 1A over contacts of keys K1, 1RB, 2RB, 3RB, and 4RB, rectifier 13, contact *a* and winding of relay P1, contacts of keys 4RB to 1RB and of key K1 to line Y, thence in Fig. 1B over contacts of keys K2 and 1LB, contacts *b* of lever 1VL and relay 1FL to the negative terminal of battery B2. Relay P1 is caused to assume its reverse position, whereupon relay R1 responds periodically to effect the selective energization of relay CD1, closing a circuit from terminal B at the right-hand contact *b* of relay P1 over back contact *b* of relay SD1, contact *d* of relay CD1, contact *f* of lever 1SW, contact *c* of lever 10SG, the left-hand contact *a* of lever 1VR through the lower winding of relay 1FR to terminal C, thereby causing relay 1FR to operate its contacts to the left. The opening of its contact *a* extinguishes lamp 1RE and the opening of its contact *d*, Fig. 2, disconnects terminal B from the circuits for the signals at station No. 1 which govern traffic movements into section 1T.

Since contacts *b* and *c* of both the traffic relays 1FR and 1FL are now closed, either direction of traffic may now be established, as desired.

To restore the original direction, the operator at station No. 1 operates lever 1VR to the right and the operator at station No. 2 again presses button 1LB to again supply interrupted current of negative polarity to the line, whereupon relay 1FR operates its contacts to the right and so assumes its original position corresponding to that of relay 1FL.

To reverse the traffic direction, the operator at station No. 1, after having operated relay 1FR to the left as above described, presses button 1RB while the operator at station No. 2 operates lever 1VL to the left. Interrupted current of negative polarity is now supplied to the line from battery B1, Fig. 1A, over a circuit similar to that already traced, and distinctive code signal received over line wires Y and Z from station No. 1 causes relay P2 to assume its reverse position, and relay R2 operates periodically to cause the selective energization of relay CD2. If the locking conditions at station No. 2 are proper, the closing of contact *d* of relay CD2 completes a circuit for relay 1FL, such as the one extending from terminal B at the right hand lower contact of relay P2, back contact *b* of relay SD2 and front contact *d* of relay CD2, and including contact *g* of lever 10SG and contact *k* of lever 11SW, for example, and the left-hand contact *a* of lever 1VL, so that relay 1FL closes its left-hand contacts and so assumes a position corresponding to that of relay 1FR. The closing of contact *a* of relay 1FL lights the directional indication lamp 1LE, and the closing of its contact *d*, Fig. 2, prepares a circuit for the mechanism 10LG for signal 10L, at station No. 2 for example, which governs traffic movements over the established route leading to section 1T. The opening of contacts *b* and *c* of relay 1FL maintains relay 1FR deenergized in the corresponding left-hand position.

It will be noted that the traffic relays being normally deenergized, are locked in their entrance positions as well as in their exit positions, so that the operator who has control of traffic movements is able to change the position of his traffic relay to give up that control only by cooperation with the operator at the other station under conditions such that his control may be reestablished, if desired. It follows that if due to a fault or to locking conditions at one of the stations, the operators are unable to complete the operations for reversing the direction of traffic they will generally be able to restore the original direction and thereby avoid a locked condition rendering the stretch unavailable for traffic movements in either direction.

It will also be noted that the operation of reversing traffic conditions as described involves a check of the locking conditions at both stations, and that these operations must be initiated by the operator at the exit end of the stretch for the already established direction of traffic in each case.

Although in the foregoing I have described in detail only the operations involving the control of traffic direction in the stretch 1T, it will be apparent that those involving stretch 2T are similar, differing only in the character of line current, steady negative current being supplied to the line by the operation of button 2LB or 2RB to selectively operate the slow pick-up relays SD in place of the code detector relays CD. Likewise those involving the stretches 3T and 4T differ only in that interrupted or steady positive current is supplied to the line so that the relays P1 or P2 occupy their normal positions when relays CD or SD are operated.

Although I have herein shown and described only one form of railway traffic 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. Traffic direction locking apparatus for a stretch of railway track having a signal at each end for governing traffic movements into said stretch, a two position traffic lever and a traffic relay of the stick polar type at each end of the stretch, a circuit controlled by each traffic lever for operating the associated relay between its normal and reverse positions, the circuit for one traffic relay being also controlled by a contact of the other traffic relay closed in its reverse position and the circuit for said other traffic relay being controlled by a contact of said one traffic relay closed in its normal position, a circuit for clearing one signal controlled by a contact of said one traffic relay closed only in its reverse position, and a circuit for clearing the other signal controlled by a contact of the other traffic relay closed only in its normal position.

2. Traffic direction locking apparatus for a stretch of railway track having a signal at each end for governing traffic movements into said stretch, a two position traffic lever, a push button, and a traffic relay of the stick polar type at each end of the stretch; line wires extending the length of said stretch, a circuit controlled by each traffic lever for operating the associated traffic relay between its normal and reverse positions, means including said line wires for energizing the circuit for each traffic relay in response to the operation of the push button at the opposite end of the stretch, the circuit for one traffic relay being also controlled by a contact of the other traffic relay closed in its reverse position and the circuit for said other traffic relay being controlled by a contact of said one traffic relay closed in its normal position, a circuit for clearing one signal controlled by a contact of said one traffic relay closed in its reverse position, and a circuit for clearing the other signal controlled by a contact of the other traffic relay closed in its normal position.

3. Traffic direction locking apparatus for a stretch of multiple track railway having signals at each end for governing traffic movements into said stretch, a two position traffic lever, a push button, and a traffic relay of the stick polar type for each of said tracks at each end of the stretch; a reversible line circuit extending the length of the stretch including selecting means and normally closed contacts of the push buttons at each end of the stretch, a circuit controlled by each traffic lever for operating the associated traffic relay between normal and reverse positions, means controlled by the selecting means at each end of the stretch when operated for completing the circuits for the traffic relays at that end of the stretch only one at a time, means responsive to the operation of each push button when the associated traffic relay occupies a particular one of its two positions for actuating the selecting means at the opposite end of the stretch to complete the circuit for the traffic relay for the corresponding track at said opposite end of the stretch, and means controlled by each traffic relay in the other of its two positions for clearing that signal which governs traffic movements into the corresponding one of said tracks at that end of the stretch.

4. Traffic direction locking apparatus for the control of traffic movements over a plurality of stretches of a railway track extending between two stations, comprising a two position traffic lever, a traffic relay of the stick polar type, and a push button at each station; two line wires connecting said stations, a local circuit controlled by each lever for operating the associated relay between its normal and reverse positions, selecting means at each station connected to said line wires over normally closed contacts of each of the push buttons at that station, means controlled by said selecting means for selectively completing said local circuits only one at a time each in response to a distinctive code signal received over said line wires, and means at each station for supplying such code signals to the line wires in response to the operation of the push buttons at that station the operation of each such button being effective only when the associated traffic relay and lever occupy a particular one of their two positions to supply that code signal to the line wires by which the traffic relay at the other station for the same stretch of track is selected.

5. Traffic direction locking apparatus for the control of traffic movements over a plurality of stretches of railway track extending between two stations comprising, a traffic locking contact at each station for each of said stretches each of which is adapted to be locked in an open position in which it prevents the movement of traffic into its stretch from the adjacent end, a traffic lever for each such contact for controlling its operation, a push button for each lever, two line wires connecting said stations, selecting means at each station connected to said line wires over normally closed contacts of each of the push buttons at at that station, means controlled by said selecting means for selectively rendering the traffic locking contacts operable by their respective levers only one at a time each in response to a distinctive code signal received over said line wires, and means at each station for supplying such code signals to the line wires in response to the operation of the push buttons at that station the operation of each push button being effective to control the traffic locking contact at the other station for a given stretch of track only when the one at the same station for that stretch is locked in its open position.

6. Traffic direction locking apparatus for the control of traffic movements over a plurality of stretches of railway track extending between two stations comprising, a traffic locking contact at each station for each of said stretches each of which is adapted to be locked in an open position in which it prevents the movement of traffic into its stretch from the adjacent end, a traffic lever for each such contact for controlling its operation, a push button for each lever, two line wires connecting said stations, means at each station for transmitting a different code signal over said line wires to the other station in response to the operation of each of said push buttons, each push button being effective to transmit its signal only when the associated traffic locking contact is locked in its open position, and selecting means at each station responsive to each such code signal transmitted from the other station for rendering the traffic locking contact for the corresponding one of said stretches of track free to be operated to its open or closed position by its lever.

7. Traffic direction locking apparatus for a plurality of stretches of railway track extending between two stations, at each of which signals are provided for governing traffic movements over various routes, established by the operation of track switches which include one or another of said stretches; comprising, a traffic locking contact at each station for each stretch, each of which is adapted to be locked in an open position in which it prevents the clearing of the signal at that station governing traffic movements over any route including its stretch, a manually operable lever for each traffic locking contact for controlling its operation, a push button for each lever, two line wires connecting said stations, means at each station for transmitting differently coded impulses over said line wires to the other station, each in response to the operation of a different one of said push buttons, each push button being effective to transmit its impulse only when the associated traffic locking contact is locked in its open position, selecting means at each station controlled over said line wires and over normally closed contacts of the push buttons at the same station in response to said impulses, a traffic locking circuit for each stretch closed by said selecting means in response to an impulse identifying the corresponding stretch each such circuit when closed rendering the associated traffic locking contact free to be operated to its open or closed position by its lever, and locking means at each station effective to prevent the closing of the traffic locking circuit for any stretch by said selecting means when a signal at the same station has been cleared for a route which includes that stretch.

8. Traffic direction locking apparatus for a plurality of stretches of railway track extending between two stations, at each of which signals are provided for governing traffic movements over different routes established by the operation of track switches, each route including one or another of said stretches; comprising, a traffic locking contact at each station for each stretch having a manually operable lever effective at times to operate the contact to its open or closed position, a push button associated therewith, a reversible line circuit connecting said stations connected normally to selecting means over normally closed contacts of the push buttons at each station, means at each station for transmitting differently coded impulses over said line circuit in response to the operation of said push buttons each push button being effective to transmit a distinctive impulse identifying the corresponding stretch of track only when the associated traffic locking contact is in its open position, a local traffic locking circuit at each station for each stretch closed by said selecting means in response to an impulse identifying the corresponding stretch of track each such circuit when closed rendering the associated traffic locking contact free to be operated to its open or closed position by its lever, means controlled in accordance with the positions of the track switches at each station for preventing the closing of the traffic locking circuit for any stretch by said selecting means when a signal at the same station has been cleared for a route which includes that stretch, and means controlled by each traffic locking contact in accordance with the position of the track switches for preventing the clearing of that signal which governs traffic movements over the route which includes the corresponding stretch except when such contact is closed.

9. Traffic direction locking apparatus for the control of traffic movements over a plurality of stretches of railway track extending between two stations; a traffic locking relay at each station for each stretch each such relay having an entrance and an exit position, a manually operable lever and a push button for each traffic locking relay, a reversible line circuit connecting said stations normally connected to a polarized line relay over normally closed contacts of the push buttons at each end, means at each station including normally open contacts of the push buttons for transmitting differently coded impulses over said line circuit to control the line relay at the other station, the transmitting circuit controlled by each push button including a source of current and a contact of the associated traffic locking relay closed in its exit position, selecting means controlled by each line relay adapted to close different selecting contacts in response to impulses identifying the different push buttons at the other station, a circuit for operating each traffic relay to its entrance or exit position in accordance with the position of its lever including the corresponding selecting contacts and also including locking contacts closed in accordance with traffic conditions only when it is proper to direct traffic toward the station over the corresponding stretch of track, means at each station for preventing the movement of traffic from that station into any of said stretches except when the corresponding traffic relay occupies its exit position, and an indicator at each station for each stretch arranged to visually indicate the position of the corresponding traffic relay.

WARREN W. SEITZ.

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