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CENTRALIZED TRAFFIC CONTROLLING SYSTEM

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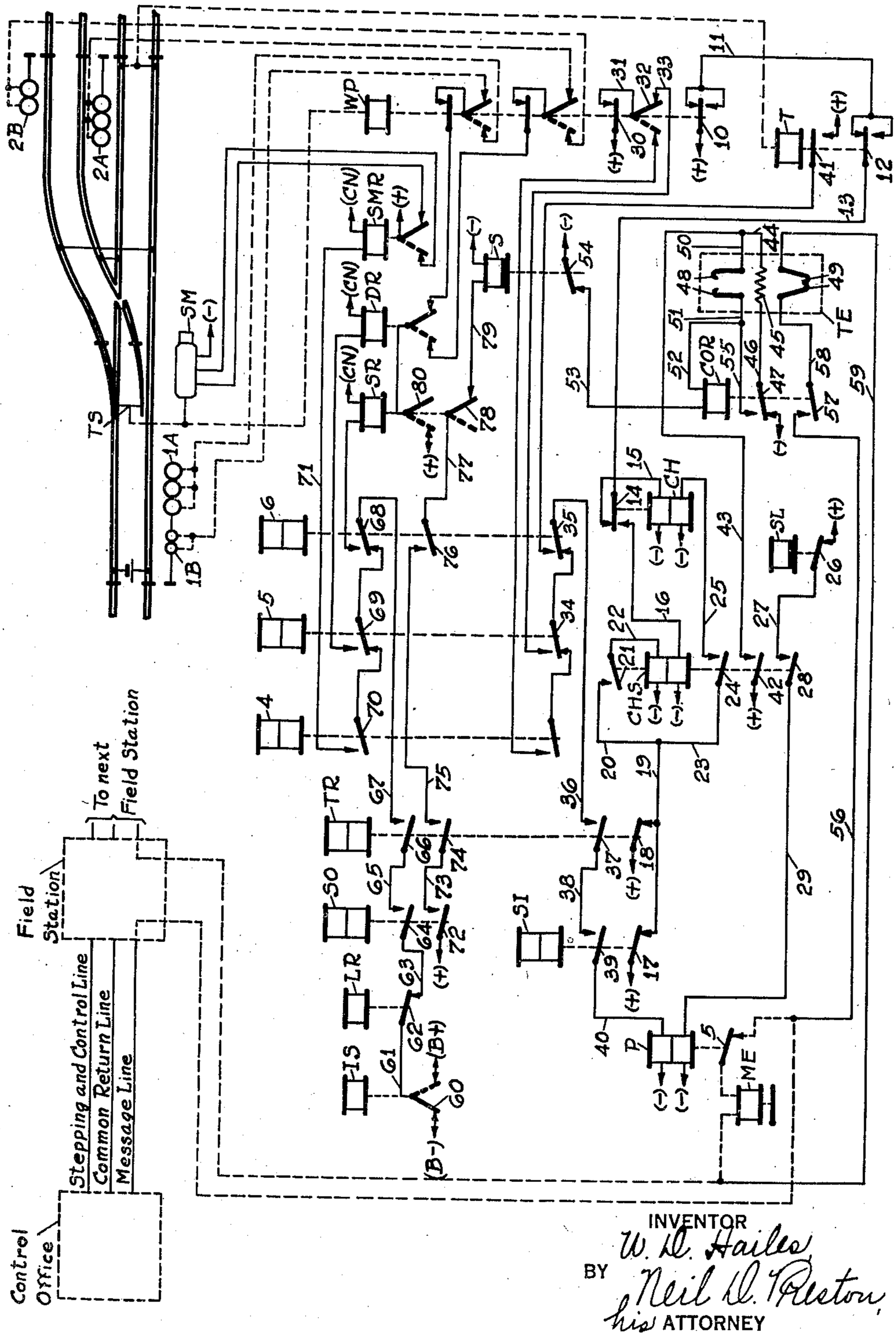

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CENTRALIZED TRAFFIC CONTROLLING SYSTEM

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This invention relates to centralized traffic controlling systems for railroads, and more particularly pertains to means employed for interrelating the operation of a plurality of traffic controlling devices with the operation of the communication part of such a system.

In that type of centralized traffic control system where a communication system of the station selective type is employed, control impulses are transmitted from the central control office to the several field stations during separate operating cycles; and similarly indication impulses are transmitted to the control office in accordance with the position of the various traffic controlling devices at the several field stations during separate operating cycles, one station for each cycle. In such a centralized traffic control system, where only one field station may be in communication with the control office at any one time, and where the communication system is normally at rest, it is necessary to provide means for storing the fact that a change in the condition or position of the traffic controlling devices at a field station has occurred, so that such a change may initiate the system for the transmission of indications from that field station in accordance with the new conditions.

However, in a centralized traffic control system of the type outlined above, it may occur that the stored condition of a change at a field station is maintained for an indefinite period of time due either to failure of the system to properly transmit the indications from that station or due to continued operation of some device or devices in rapid succession. In either case, the net result is the continual control of the indication transmitting line by that station, which is particularly undesirable as some other field station may thereby be prevented from transmitting important indications.

In view of the above and other conditions, the present invention proposes to provide means whereby the fact of a changed condition at a field station may be suitably stored with this storing means having associated therewith other means which prevents that field station from either initiating the communication system into operation or transmitting indications to the control office after a change in indication conditions has been stored for a predetermined time.

The present invention not only provides automatic means for cutting out or suppressing a field station in the event of the occurrence of certain predetermined conditions, but also provides means whereby such automatic means may be manually restored to normal, so that the field station may operate in the usual manner.

Other objects, purposes and characteristic features of the present invention will be in part obvious from the accompanying drawing and in part pointed out as the description of the invention progresses.

In describing the invention in detail, reference will be made to the accompanying drawing, which illustrates in a diagrammatic manner the apparatus and circuits employed at a single field station in accordance with the present invention and associated with a communication system indicated as connecting the traffic controlling devices at that field station with a suitable control office.

A centralized traffic control system, organized as contemplated in accordance with the present invention, is considered as comprising a control office located at a convenient point and a plurality of field stations located throughout the territory under the control of the operator. The communication system extending between the control office and these several field stations may be of any suitable type, but for convenience in disclosing the present invention it is assumed that such communication system is of the station selective duplex coded type as disclosed for example in the pending application of N. D. Preston et al., Ser. No. 455,304, filed May 24, 1930. It is to be understood, however, that the specific form of a communication system is not essential to the functioning of the means embodying the present invention, but rather the means embodying the present invention may be considered as an adjunct to any communication system.

In the communication system contemplated as used in connection with the present invention, a series stepping and control line circuit connects the control office with the several field stations and receives current impulses from a suitable source of energy located in the control office; while a series message or indication line circuit, which receives energy from a suitable source in the control office, is impulsed from any one or several of the field stations.

With reference to the accompanying drawing, a control office, indicated by a dotted rectangle, is illustrated as connected to a field station, also indicated by a dotted rectangle, by three line wires, namely, a stepping and control line, a common return line, and a message line. A message line relay ME is included in the series message or indication circuit at each field station together with a contact 5 included in series therewith, which contact 5 is operated by a pulsing

relay P in accordance with the indications to be transmitted.

This system is of the station selective type and a station is selected for receiving control impulses whenever a relay SO and a relay TR are energized at that station. Similarly, whenever a relay SI and a relay TR are energized at a station, the relay P may be controlled in accordance with the indications to be transmitted on each step from that station. Also, the energization of this relay P, when the system is at rest, causes the system to be immediately initiated into a cycle of operation.

During the application of each control impulse to the stepping and control line, the contacts of a line repeating relay LR are picked up and an impulse storing relay IS is governed in accordance with the character of that control impulse, but, during the period intervening between control impulses, the contacts of the relay LR are dropped away so the particular control relay provided for that step may be actuated in accordance with the impulse storing relay IS.

The control relays illustrated include a switch machine relay SMR, a traffic direction relay DR and a signal relay SR. These control relays are of the two position magnetic stick type.

As an understanding of the station selecting part of each cycle is unnecessary for an understanding of the present invention, only those relays of the stepping relay bank have been illustrated which operate during the control part of the cycle. These relays include stepping relays **4**, **5** and **6**.

A change relay CH is provided to respond to the sequential or simultaneous change in condition of the various traffic controlling devices located at that station, while a change storing relay CHS is provided to store such changed condition until a proper transmission of the indications has been effected.

A slow acting relay SL is picked up at the beginning of each cycle of operation and is maintained energized until the end of such cycle of operation.

A slow acting relay S is provided to receive an executing impulse under certain conditions explained hereinafter.

Although a field station may comprise several track switches arranged in any particular layout desired, only a single track switch TS has been shown for connecting a diverging route to a main track. This track switch TS is provided with the usual detector track section having a track relay T and the usual track battery.

Signals **1A**—**1B** are provided for controlling traffic over the track switch in an east bound direction; while signals **2A**—**2B** are provided to control traffic in a west bound direction. These signals are preferably controlled in part by traffic conditions and in part by the operator located at the central control office by means of the communication system associated therewith. These signals are controlled by the operator through the medium of relays SR and DR. Whenever the contacts of the relay SR are in right hand positions all of these signals are caused to indicate stop, but with the contacts of this relay SR in left hand positions a particular signal as selected by the direction relay DR and the position of the track switch, may indicate proceed subject to traffic conditions.

The position of the track switch TS is indicated by the usual polar neutral switch repeating relay WP, which is controlled by a polarized circuit governed by point detector contacts jointly operated by the track switch TS and a switch machine SM. When the track switch is in its normal position, the relay WP is energized with one polarity and when the switch is in the opposite position, the relay WP is energized with the opposite polarity, but whenever the track switch TS is unlocked or in operation, the relay WP is deenergized.

The track switch TS is illustrated as operated from one extreme position to the other by a switch machine SM which may be of any suitable type, such for example as shown in the patent to W. K. Howe, No. 1,466,903, dated September 4, 1923.

A cut-out relay COR is provided having associated therewith a time element relay TE. These relays coact for the purpose of shunting the indication relay ME and the P relay contact, whenever a change has been stored by the change storing relay CHS for a predetermined period of time. The time element relay TE is illustrated as being of the thermal type and as having both front and back contacts.

In place of showing the actual connections to the terminals of suitable sources of potential, symbols have been employed to represent such terminals. The symbols (B+) and (B—) have been employed to designate the opposite terminals of a suitable source of electrical potential having a center or intermediate tap designated (CN); and the circuits with which these symbols are employed may have current flowing in either direction depending upon which terminal is employed in combination with the tap (CN). The symbols (+) and (—) have been employed to designate the opposite terminals of a suitable source of potential and the circuits with which these symbols are employed always have current flowing in the same direction.

It is believed that the operation and usefulness of the present invention will be best understood by further description being set forth from the standpoint of operation.

Operation

Normal conditions.—The track relay T is normally energized according to the usual practice. Similarly, the relay WP is energized with a particular polarity in accordance with the normal locked condition of the track switch TS.

With the system normally at rest, the change relay CH is maintained energized through its stick circuit closed from (+), through front contact **10** of relay WP, wire **11**, front contact **12** of track relay T, wire **13**, front contact **14** of change relay CH, wire **15**, upper winding of relay CH, to (—).

In order that the communication system may be initiated into operation from each of the several field stations of the system, the message circuit is normally energized at the control office which circuit includes the relay ME at this station and contact **5** of relay P in series therewith.

Automatic transmission of indications.—Any change in the indication conditions at a field station, as for example, the occupancy of the detector track section deenergizing the track relay T, or the change in position of the track switch TS, the position of which is indicated by the relay WP, causes the deenergization of the change relay CH and the energization of the change storing relay CHS which in turn energizes the relay P and thereby opens the message line circuit at open back contact **5**. This opening of the message circuit causes it to be deenergized at

each of the field stations and at the control office, which deenergization initiates the system into a cycle of operation.

More specifically, let us assume for example that the track relay T is deenergized due to the passage of a train, then the movement of contact 12 from a front point to a back point momentarily opens the stick circuit of the change relay CH allowing its contacts to assume deenergized positions.

The deenergization of the change relay CH closes a pick-up circuit for the change storing relay CHS from (+), through front contact 10 of relay WP, wire 11, back contact 12 of track relay T, wire 13, back contact 14 of change relay CH, wire 16, lower winding of the change storing relay CHS, to (—).

Immediately upon the energization of the change storing relay CHS, its stick circuit is closed from (+), through back contacts 17 and 18 of relays SI and TR respectively in multiple, wires 19 and 20, front contact 21 of relay CHS, wire 22, upper winding of change storing relay CHS, to (—). This stick circuit is maintained closed until the station has been registered in the control office and selected for the transmission of its indications.

Also, at the time that the relay CHS is picked up, a pick-up circuit is closed for the change relay CH from (+), through back contacts 17 and 18 of relays SI and TR in multiple, wires 19 and 23, front contact 24 of change storing relay CHS, wire 25, lower winding of change relay CH, to (—).

The energized change storing relay CHS closes a pick-up circuit for the relay P, if the system is at rest as marked off by the relay SL. This pick-up circuit is closed from (+), through back contact 26 of relay SL, wire 27, front contact 28 of relay CHS, wire 29, lower winding of relay P, to (—).

The energization of the relay P opens back contact 5, thereby deenergizing the message line circuit which deenergization causes the system to be initiated into a cycle of operation.

A cycle of operation thus initiated is more particularly for the registration of this field station and the transmission of its indications. However, some other field station may have a change occur simultaneously with the change at this station (one illustrated) under which circumstances the stations are registered in accordance with their superiority. Also, it may happen that controls are ready at the same time for transmission to this station or some other station. It is assumed, as above mentioned, that a communication system of the coded duplex type is employed, as disclosed in application Ser. No. 455,304, filed May 24, 1930, and that these features of superiority and duplex need not be explained for an understanding of the present invention.

The initiation of the system, irrespective of whether controls are to be transmitted or not, results in the synchronous operation of the stepping relays at the control office and at each field station. The application of the first stepping impulse to the stepping circuit causes the relays LR and SL to be energized. The relay SL is slow acting and remains energized throughout the cycle because of the successive stepping impulses, while the relay LR repeats each stepping impulse.

If this station is the only one calling, or if this station is the most superior of those that are calling, it is registered in the control office and is selected during the first part of the operating cycle. Its selection is indicated by the energized condition of the relays SI and TR, while the relays SI and TR are deenergized at all other stations.

With the contacts 17 and 18 of the relays SI and TR respectively picked up, the pick-up circuit for the relay CH is opened, and similarly the stick circuit for the relay CHS is opened. Thus, the change relay CH is resensitized, so to speak, and is now maintained energized through its stick circuit previously traced.

During the remainder of the operating cycle initiated by this field station, the relay P is controlled in accordance with the indications to be transmitted, thereby impulsing the series message line in such a manner as to transmit the indications of this field station to the control office. Under the conditions specifically assumed, the relay P is left deenergized on the fourth step but is energized on the fifth and sixth steps, as marked off by the stepping relays 4, 5 and 6, which are synchronously operated with a corresponding number of relays in the control office. For example, on the fifth step, relay P is energized through a circuit from (+), through front contact 30 of relay WP, wire 31, polar contact 32 of relay WP in its right hand position, wire 33, front contact 34 of stepping relay 5, back contact 35 of stepping relay 6, wire 36, front contact 37 of transfer relay TR, wire 38, front contact 39 of station selecting relay SI, wire 40, upper winding of relay P, to (—). Similarly, the relay P is energized on the fourth step of an operating cycle when the contact 32 assumes its left hand position, through a circuit readily traced in the drawing.

In a similar manner on the sixth step, the relay P is energized through a circuit including back contact 41 of relay T and front contact 35 of stepping relay 6, it being assumed that the train is on the detector track section, as previously stated.

This control of the relay P causes the series message line circuit to be left energized or to be deenergized on the respective steps, and these conditions are repeated by the relays ME at each of the field stations (including this station) and at the control office.

When the predetermined number of steps have been taken the stepping circuit ceases to be impulsed and the relay SL drops away. The relays SI, TR and the stepping relays drop away a short time after the relay SL, as their stick circuits (not shown) are not opened until the contacts of the relay SL are in deenergized positions.

Automatic suppression of a station.—If the transmission of indications resulting from the initiation of the system by this station occurs within a predetermined time, the system returns to its normal at rest condition, as illustrated. However, if the selection of the station for the transmission of the indications and the resulting deenergization of the change storing relay CHS does not occur within the predetermined time, the cut-out relay COR is picked up and the relay ME and back contact 5 of relay P are shunted so that this station is prevented from interfering with the transmission of indications from other field stations.

The change relay CHS might be undesirably maintained energized due to failure of the selection of the station in a proper manner, due to the repeated operation of some device such as

relay T, for example, or due to some other erroneous undesired functioning of the system.

In any event, as soon as the change storing relay CHS is picked up, a circuit is closed for the heating element of the thermal time element relay TE, which circuit is closed from (+), through front contact 42 of relay CHS, wires 43 and 44, thermal element 45, wire 46, back contact 47 of relay COR, to (—).

After a time, this energization of the heating element 45 causes the front contacts 48 to close and the back contacts 49 to open. The closure of front contacts 48 completes a pick-up circuit for the relay COR from (+), through front contact 42 of relay CHS, wires 43 and 50, front contacts 48 of time element relay TE, wires 51 and 52, windings of cut-out relay COR, wire 53, back contact 54 of stop relay S, to (—).

The picking up of the contacts of the relay COR, closes a stick circuit for this relay COR from (+), through front contact 42 of change storing relay CHS, wires 43 and 44, thermal element 45, wire 46, front contact 47 of relay COR, wires 55 and 52, windings of relay COR, wire 53, back contact 54 of stop relay S, to (—). Although this stick circuit includes the thermal element 45 of the time element relay TE, the current which flows in this circuit is insufficient to appreciably effect the time element relay so that it gradually cools in accordance with its characteristics and thereby closes back contacts 49 and opens front contacts 48. However, the current which flows in this stick circuit is of sufficient value to maintain the relay COR energized.

After the back contacts 49 of the time element relay TE are closed, a shunting circuit for the relay ME and back contact 5 of relay P is completed from the message line circuit extending from the control office to this field station, through wire 56, front contact 57 of relay COR, wire 58, back contacts 49 of the time element relay TE, wire 59, to the message line wire extending to the succeeding field stations.

In other words, the message line relay ME and the contact 5 of the relay P are shunted or rendered ineffective for the communication system after a predetermined time following the energization of the change storing relay CHS, which predetermined time is measured by the heating and cooling time of the thermal time element relay TE. If the change storing relay CHS is denergized in the usual time period required for the proper transmission of its associated indications as above described, then this shunt circuit is not completed as both the stick and pick-up circuits for the relay COR are then opened by front contact 42 of relay CHS. If on the other hand the relay CHS is maintained energized for an indefinite time greater than the predetermined time measured by the device TE, this station is cut-out or suppressed until it is manually restored, as hereinafter pointed out.

It is to be understood in connection with the embodiment of the present invention, that any other suitable portion of the transmitting and initiating part of the station may be shunted or open circuited in order to accomplish the suppression of the station, and still come within the scope of the invention. For example, it may be desirable in some cases to shunt only the back contact 5 of the relay P instead of shunting both the windings of the relay ME and back contact 5, as illustrated. In those cases where a suitable portion of the station is open circuited for suppressing the station, the same devices may be used, but the cut-out circuit is rearranged with suitable contacts on the relay COR and time element device TE, all of which is within engineering skill and therefore need not be disclosed herein.

Manual restoration.—If a field station has been cut out or suppressed automatically as above described, it may be manually restored by the selection of the corresponding field station for the transmission of control impulses thereto. This selection of the field station is accomplished by placing the proper code call of the station on the stepping and control line circuit, which results in the energization of the relays SO and TR during the station selecting part of the operating cycle. Following the selection of the station, the relays 4, 5 and 6 mark off the successive steps in synchronism with the control office and the relay IS is conditioned in accordance with the character of each of the control impulses.

During the execution period of each of the steps, the relays SMR, DR and SR are respectively controlled by the relay IS, these execution periods of each step being marked off by the quick acting line repeating relay LR. For example, the relay SMR is operated to either of its extreme positions on the fourth step depending upon the character of the code impulse stored in the relay IS while the stepping and control line is energized and the contacts of the relay LR are picked up. Assuming the stepping relay 4 to be energized and the quick acting line repeating relay LR to be deenergized, then the relay SMR is energized through a circuit from either (B+) or (B—) with contact 60 of relay IS in either its right hand or its left hand position respectively depending upon the character of the impulse transmitted at the beginning of the step, through wire 61, back contact 62 of relay LR, wire 63, front contact 64 of relay SO, wire 65, front contact 66 of relay TR, wire 67, back contact 68 of stepping relay 6, back contact 69 of stepping relay 5, front contact 70 of stepping relay 4, wire 71, windings of relay SMR, to (CN). In a similar manner the relays DR and SR are controlled on the respective steps.

If the operator desires to effect the restoration of a particular field station that has been automatically suppressed, he causes the transmission of a stop control so as to position the contacts of the relay SR in right hand positions. As shown in the conventional illustrations of the signal control circuits, the positioning of contact 80 in its right hand position causes the signals 1A—1B and 2A—2B to be held at stop; while the positioning of contact 80 in its left hand position causes the proper one of the signals 1A—1B and 2A—2B to be cleared as selected by the direction relay DR and the position of the track switch TS as repeated by relay WP. It is of course to be understood, that the signals 1A—1B and 2A—2B are subject to traffic conditions in accordance with the usual block signalling practices, as disclosed for example in the application of S. N. Wight, Ser. No. 120,423, filed July 3, 1926.

The control of the signals, however, is not necessary for an understanding of the present invention, but it is sufficient to know that when a field station is selected and the signals governed thereby are put to stop by the signal control relay SR, or its equivalent, and a stop relay S is momentarily energized at the end of the operating cycle.

More specifically, the stop relay S is energized through a circuit from (+), through front con-

tact 72 of relay SO, wire 73, front contact 74 of relay TR, wire 75, front contact 76 of stepping relay 6 (in this case), wire 77, polar contact 78 of relay SR in its right hand position, wire 79, windings of relay S, to (—).

This energization of the stop relay S is maintained only during the time that it takes for the system to return to its normal at rest condition after the last step (sixth in this case) has been taken. In other words, as soon as the last step is taken the relay S is energized, but the system immediately returns to its at rest condition deenergizing the relay SL followed by the deenergization of the relays SO, TR and 6, for reasons above pointed out. Upon the deenergization of the relays SO, TR and 6, the relay S is deenergized.

The momentary or temporary energization of the stop relay S opens the stick circuit for the cut-out relay COR at open back contact 54 which causes the relay COR to be deenergized in spite of the energized condition of the change storing relay CHS. As the change storing relay CHS remains energized until its indications have been properly transmitted, this station is given another chance to initiate the system and transmit its indications during a predetermined time marked off by the thermal time element relay TE. If the field station fails to be properly selected and transmit, it is again automatically suppressed after the elapse of the predetermined time beginning upon the deenergization of the relay S.

The system is initiated upon the energization of the track relay T in a similar manner as upon its deenergization. In other words, any time that the relays T and WP are either energized or deenergized causing the contacts 10 and 12 respectively to move from front points to back points or vice versa, the stick circuit for the change relay CH is momentarily opened. As the change relay CH is a quick acting relay relative to the relays P and WP, this momentary opening has sufficient time for its contacts to assume deenergized positions thereby definitely opening the stick circuit. These features with respect to storing a change in the indication conditions have been explained in detail in the pending application of De Long et al., Ser. No. 477,364, filed August 23, 1930.

Thus, means has been shown and described for automatically suppressing the field station of a centralized traffic control system after a predetermined time following a change in indication conditions at that field station, which provides that such a field station equipped with the system of the present invention, will not monopolize or maintain control of a message line circuit and thereby prevent other field stations of the system from sending in their proper indications. The present invention further provides that the automatic suppressing of a field station may be under the control of the operator, so that the operator may restore any station, which has been automatically suppressed, to its normal operating conditions.

Although the embodiment of the invention illustrates the control of the change relay CH as being associated only with the relays T and WP, it is to be understood that other means may be associated therewith for the purpose of initiating an indication cycle. For example, the change relay CH may be deenergized by the momentary energization of the stop relay S when it is desired to initiate an indication cycle manually, all of which has been disclosed in the pending application of N. D. Preston, Ser. No. 560,356, filed August 31, 1931, and therefore need not be described in detail.

Having described a centralized traffic control system as one specific embodiment of the present invention, it is desired to be understood that this form is selected to facilitate in the disclosure of the invention rather than to limit the number of forms which it may assume; and, it is to be further understood that various modifications, adaptations and alterations may be applied to the specific form shown to meet the requirements of practice, without in any manner departing from the spirit or scope of the present invention except as limited by the appended claims.

What I claim is:—

1. In a centralized traffic control system for railroads, a communication system having a series message circuit including a message relay and a pulsing contact in series at a field station, a plurality of devices at said field station, indication means operating said pulsing contact upon a predetermined number of steps in accordance with the condition of said devices, said indication means being initiated upon a change in condition of any one of said devices, cut-out means including a shunt circuit for automatically rendering said communication system ineffective to transmit an indication by shunting said message relay and pulsing contact, said cut-out means being effective if said predetermined number of steps is not taken before a predetermined time, and manually operable means for rendering said automatic cut-out means ineffective.

2. In a centralized traffic control system for railroads, a control office connected to a field station having a plurality of traffic controlling devices controlled by a communication system, indication transmitting means, a change storing relay for registering a change in the condition of any one or all of said traffic controlling devices, a stop relay manually governable, a cut-out relay, a time element device, a pick-up circuit for said cut-out relay including front contacts of said time element device and said change storing relay and a back contact of said manually governable stop relay, a stick circuit for said cut-out relay including front contacts of said cut-out relay and said change storing relay and a back contact of said manually governable stop relay, and a cut-out circuit including a front contact of said cut-out relay and back contacts of said time element device for rendering said indication transmitting means ineffective.

3. In a centralized traffic controlling system for railroads; control and message line circuits connecting a control office and a field station; a plurality of traffic controlling devices at the field station; indication transmitting means for transmitting indications over said message line circuit by operating a code transmitting contact included therein; a change storing relay for registering a change in the condition of any one or all of said traffic controlling devices; a stop relay manually governed over said control line circuit; a cut-out relay; a time element device for measuring time subsequent to the operation of said change storing relay; a pick up circuit for said cut-out relay including front contacts of said time element device and said change storing relay, and a back contact of said stop relay; a stick circuit for said cut-out relay including front contacts of said cut-out relay and said change storing relay, and a back contact of said stop

relay; and a suppression circuit including a front contact of said cut-out relay and back contacts of said time element device, said suppression circuit shunting the code transmitting contact included in said message line circuit.

4. In a centralized traffic controlling system for railroads; control and message line circuits connecting a control office and a field station; a code transmitting contact included in said message line circuit at the field station; a plurality of traffic controlling devices at the field station; indication transmitting means for transmitting indications of the condition of said traffic controlling devices over said message line circuit by operating, when initiated, said code transmitting contact included in said message line circuit; a change storing relay for registering a change in the condition of any one or all of the said traffic controlling devices and for initiating said indication transmitting means within a predetermined time after storing a change; a stop relay manually governable over said control line circuit from said control office; a cut-out relay; a time element device for measuring a greater time than said predetermined time subsequent to the storing of a change by said storing relay, said time element device closing front contacts when said greater time has been measured; a pick up circuit for said cut-out relay including front contacts of said time element device and said change storing relay, and a back contact of said stop relay; a stick circuit for said cut-out relay including front contacts of said cut-out relay and said change storing relay and a back contact of said stop relay; and a circuit including a front contact of said cut-out relay for shunting said code transmitting contact included in said message line circuit.

5. In a centralized traffic controlling system for railroads; control and message line circuits connecting a control office and a plurality of field stations; a code transmitting contact included in said message line circuit at each of said plurality of field stations; a plurality of traffic controlling devices at each of said field stations; an indication transmitting means at each field station for transmitting indications of said traffic controlling devices at such field station over said message circuit by operating said code transmitting contact at such field station; a change storing relay at each field station for registering a change in the condition of any one or all of said traffic controlling devices and for initiating said indication transmitting means within a predetermined time after storing a change; a stop relay at each field station manually governable over said control line circuit from the control office; a cut-out relay at each field station; a time element device at each field station for measuring a greater time than said predetermined time subsequent to the storing of a change by said change storing relay at that station, said time element device closing front contacts when said greater time has been measured; a pick up circuit for said cut-out relay at each field station including front contacts of said time element device and said change storing relay, and a back contact of said stop relay; a stick circuit for said cut-out relay at each field station including front contacts of said cut-out relay and said change storing relay, and a back contact of said stop relay; and a circuit at each field station including a front contact of said cut-out relay at that station for shunting said code transmitting contact included in said message line circuit at such station.

6. In a centralized traffic controlling system for railroads; a communication system having a series message line circuit connecting a control office and a plurality of field stations; said message line circuit including a message line relay and a pulsing contact at each of the field stations; a plurality of devices at each field station, indication transmitting means at each station for operating said pulsing contact at that station during a transmitting operation in accordance with the condition of said devices at that station, said indication means being initiated into a transmitting operation upon a change in the condition of any one or all of such devices at its station; cut-out means at each field station automatically rendering said indication transmitting means ineffective if a transmitting operation is not initiated before a predetermined time after a change in the condition of said devices, said cut-out means rendering said communication system ineffective by shunting said message relay and pulsing contact at that field station; and manually operable means at each field station for rendering said automatic cut-out means ineffective; whereby the failure of a message relay or a pulsing contact at a field station can be automatically shunted without effecting the operation of the remaining field stations of the system.

7. In a centralized traffic indication system for railroads, the combination with a communication system including line wires connecting a central office and a plurality of field stations for transmitting distinctive indications over said line wires, of normally inactive coding means at each field station for transmitting a code to said office over said line wires, initiating means at each field station for when active tending to render said coding means active, a stick relay for when energized rendering said initiating means inactive, a control relay at each field station controlled distinctively over said line wires from said office, a thermal relay rendered active when said initiating means is actuated and having a contact closed a predetermined time after it is rendered active, a pick-up circuit for said stick relay including the contact of said thermal relay and a back contact of said control relay, and a stick circuit for said stick relay also including said back contact, whereby said initiating means cannot be rendered inactive while said control relay is energized and whereby said stick relay if once energized will remain energized independently of the opening of the contact of said thermal relay.

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