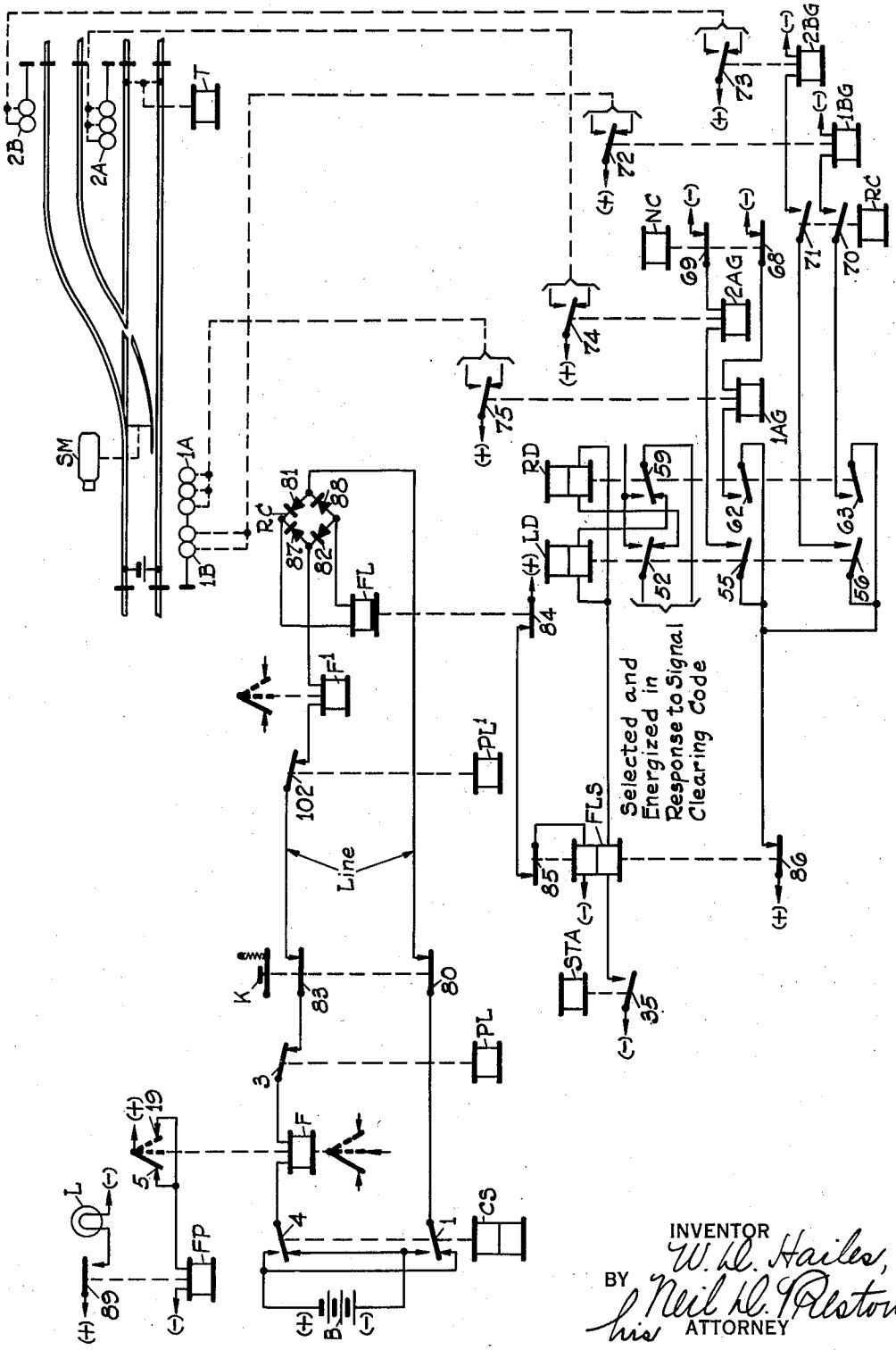
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CENTRALIZED TRAFFIC CONTROLLING SYSTEM FOR RAILROADS

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CENTRALIZED TRAFFIC CONTROLLING SYSTEM FOR RAILROADS

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My invention relates to remote control systems of the type comprising a control office and a plurality of field stations connected by a line circuit over which codes are transmitted for the purpose of communicating intelligence between the several stations and the office.

In systems of the type described, it is customary to carry the line circuit through the several stations in series and it follows that, in order to control a particular signal at any one of the stations, it is necessary to first transmit a station selecting code over the line circuit for selecting the desired station and then transmit a code for controlling the desired signal in the desired manner.

My invention provides a means for deliberately opening the line circuit to put a signal to stop with greater assurance than by sending a regular stop code for this purpose.

My invention also provides means whereby an open line circuit condition, due to a faulty condition of the line circuit, puts all signals to stop at those stations connected to the line circuit and having the special organization provided by my invention, as shown in the accompanying drawing.

In one form of remote control system which has been proposed, the communication between the office and the several stations is accomplished by means of codes which are formed by periodically interrupting the normally closed line circuit. In practicing my invention, I provide at each station a fault relay arranged to be operated in a distinctive manner if the line circuit is open for a time interval longer than the greatest period of open circuit normally occurring during code transmission. The fault relay is a slow releasing relay in series with the line circuit at the field station and is so designed that it will release when the line circuit is held open for an extremely long period of time.

The slow acting fault relay remains in its energized position, in which position it completes a stick circuit for a fault stick relay, this latter relay controlling the signal clearing circuits at the associated station.

I will describe a preferred form embodying my invention and will then point out the novel features thereof in the appended claims.

The accompanying drawing is a diagrammatic view illustrating one form of remote control system embodying my invention. I have shown a remote control system comprising a control office and a single field station connected by a two wire line circuit and although only one station is illustrated, it will be understood that additional stations are ordinarily provided and controlled in series over the illustrated line circuit.

The line circuit is normally energized and includes a source of current in the control office, illustrated as being a battery B, and a plurality of line relays, one located at the office and one at each station and all connected in series in the line circuit. Each line relay is designated by the reference character F with an exponent corresponding to the location. Relay F is located in the control office and relay F^1 is assumed to be located at the first field station.

A transmitter relay is also provided in the control office and at each field station, designated by the reference character PL with an appropriate exponent and equipped with back contacts included in the line circuit. The transmitter relays may be selectively operated by means forming no part of the present disclosure, to interrupt the line circuit for operating step-by-step mechanisms at all locations in synchronism. The step-by-step mechanisms are operated in response to the impulses applied to the line circuit by virtue of the operation of the line relays.

A code selecting relay CS is provided in the control office for selecting the polarity with which the line circuit is energized during each impulse period, this polarity being selectively applied to the line circuit through contacts 1 and 4 of relay CS. Since the line circuit is normally energized by energy applied from battery B, with the (+) terminal of this battery connected to the lower line, the line relays are assumed to have their polar contacts normally positioned to the left. When relay CS is picked up, current is reversed in the line circuit and the line relays operate their polar contacts to the right. For controlling the various local circuits in the control office and at the field stations, line repeater relays are ordinarily provided, such as relay FP shown as being energized when relay F has either of its contacts 5 or 19 closed.

One form of remote control system operating in the manner thus far described is disclosed and claimed in an application for Letters Patent of the United States, Ser. No. 635,062, filed by T. J. Judge, on September 27, 1932, corresponding to British patent 419,401, for Centralized traffic controlling systems. Systems of this character are particularly suitable for, though in no way limited to, use in centralized traffic controlling systems for railroads, in which governing devices such as railway switches and signals located adjacent the several field stations, are controlled from a control office and in which the condition

of the apparatus at the several stations is indicated in the control office.

In order to provide a means for quickly putting signals to stop at all stations equipped with the fault relay and associated circuits, I provide a key K in the control office for opening the line without the necessity of applying codes thereto.

Fault relay FL at the field station is connected across diagonal points of a network comprising rectifiers 81, 82, 87 and 88, such rectifiers being included in the line circuit for the purpose of causing current to always flow through the winding of relay FL in the same direction, irrespective of the polarity of the impulse current applied to the line in the control office. This is necessary to prevent the momentary release of relay FL, even though this relay is slow releasing, when the current through its winding is reversed, which would momentarily break the stick circuit for the fault stick relay FLS.

Each station is assumed to be provided with left and right direction relays LD and RD respectively and signal control relays 1AG, 2AG, 1BG and 2BG for controlling signals 1A, 2A, 1B and 2B respectively. Station relay STA at the associated station is picked up when this station is selected from the control office. One form of system comprising such direction and signal control circuits is disclosed and claimed in Letters Patent of the United States, issued to T. J. Judge, No. 2,045,951, issued June 30, 1936. Reference may be made to this patent for the detailed operation of the station relay STA, the direction relays LD and RD and the signal control relays, all of which have been given reference characters corresponding to the associated relays of the Judge patent.

Furthermore, the reference characters associated with the contacts of relays STA, LD, RD and the signal controlling relays are the same as illustrated in connection with the corresponding contacts of the corresponding relays of Patent 2,045,961. Likewise reference characters 1, 3, 4, 5, 19 and 102 of the line circuit organization in the accompanying drawing correspond to similar reference characters in the above mentioned Judge application Ser. No. 635,062. The reference characters used in connection with the apparatus added in accordance with the present invention are in the 80 series.

During the normal-at-rest condition of the system, the back contacts of relays PL, PL^1 (and the like) remain closed so that the line circuit is normally energized. The energization of the line circuit effects the energization of the line relays and fault relay FL over a circuit which may be traced from the (+) terminal of battery B, back contact 1 of relay CS, normally closed contact 80 of key K, lower line conductor, rectifier 81, winding of relay FL, rectifier 82, winding of relay F^1, back contact 102 of relay PL^1, upper line conductor, normally closed contact 83 of key K, back contact 3 of relay PL, winding of relay F and back contact 4 of relay CS, to the (−) terminal of battery B. Relay FL being energized closes a stick circuit for relay FLS extending from (+), front contact 84 of relay FL, front contact 85 of relay FLS and upper winding of relay FLS, to (−). Front contact 86 of relay FLS is closed for applying (+) potential by way of the contacts of the LD and RD relays and the contacts of the NC and RC relays to the signal control relays, so that the signal control relays can be selectively controlled in accordance with the energization of the direction relays, these latter relays being selected and energized in response to a signal clearing code.

During the operation of the system for the transmission of codes, the line circuit is opened at such a rate that relay FL does not release and therefore the stick circuit for relay FLS is maintained complete. When the current is reversed in the line circuit from that above described, relay FL is energized in the same direction as previously described by way of rectifiers 87 and 88. If a break occurs in the line circuit the line relays and line repeater relays will be deenergized, with line repeater relay FP in the control office closing a circuit at back contact 89 for lighting lamp L, the steady illumination of this lamp being an indication to the attendant that the line is in an open circuit condition. It will be apparent that the intermittent operation of relay FP during the normal impulsing of the system will cause lamp L to flash, thus giving a distinctive indication as to the condition of the line.

The break in the line circuit also effects the continued deenergization of relay FL and after a period of time determined by the slow acting characteristics of this relay, its front contact 84 is opened which opens the stick circuit for relay FLS, causing this latter relay to release and at open front contact 86 the circuits of all AG relays are deenergized, so that they will all be in their dropped away condition for putting all associated signals to stop.

It will be also understood that relays FL and FLS are released if the attendant in the control office holds key K in its open circuit condition for an appreciable length of time.

After having thus put the signals to stop, the line wires may be closed up, either by the restoration of key K or, if a break in the line has occurred, by this break being repaired, which will permit the system to go into its normal condition in response to a comparatively long energization of the line circuit. At the station or stations having fault stick relays however, the signal clearing circuits are not put into operation until the fault stick relays are picked up. The picking up of these relays may be accomplished by manual means at the associated stations or, as illustrated in the accompanying drawing, they may be picked up in response to a signal clearing code.

Assuming that relay FLS is deenergized and that the line is in condition for normal operation, the illustrated station is selected and relay STA is picked up in response to the station selection code. Then some signal clearing code is transmitted which energizes either the lower winding of relay LD by way of back contact 59 or the lower winding of relay RD by way of back contact 52, either circuit extending through the lower winding of relay FLS and front contact 35, to (−). Relay FLS is therefore momentarily energized by way of its lower winding in response to a signal clearing code and its stick circuit again completed, with (+) energy applied to the signal control relays by way of its front contact 86.

It will be understood that, in the application of this auxiliary control to multiple field stations, it is not necessary to equip each field station with the control but it might be found desirable to equip only certain locations, so that the opening of the control line is effective to put signals to stop only at certain desired stations, while the signals at other non-equipped stations remain in their clear positions, thus not interferring with train operation at those stations not so equipped.

Having thus described a remote control system

as one 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. A centralized traffic controlling system for railroads comprising a control office and a field station connected by a normally energized line circuit; a signal at said station; a slow acting fault relay included in said line circuit at said station; a stick relay at said station having a stick circuit energized through front contacts of said fault and said stick relays, whereby said stick circuit is deenergized in response to an open condition of said line circuit sufficiently long to drop said fault relay; means independent of said stick circuit for energizing and picking up said stick relay; and circuit means requiring that said stick relay be in its picked up position for permitting the clearing of said signal.

2. A centralized traffic controlling system for railroads comprising a control office and a field station connected by a normally energized line circuit; a plurality of signals at said station; a slow acting fault relay included in said line circuit at said station; a stick relay at said station having a stick circuit energized through front contacts of said fault and said stick relays, whereby said stick circuit is deenergized in response to an open condition of said line circuit sufficiently long to drop said fault relay; means independent of said stick circuit for energizing and picking up said stick relay; and circuit means requiring that said stick relay be in its picked up position for permitting the clearing of said signals.

3. In combination, a control office, a distant field station including a section of railway track and a signal for controlling traffic over said section, and a communication system for controlling said signal from said control office comprising; a normally energized line circuit connecting said office and said field station energized by a source of current in said office, means in said office for intermittently deenergizing and reenergizing said line circuit to impress a code thereon including a plurality of successive deenergizations of the line circuit, a signal control relay at said field station for when energized tending to clear said signal, a station relay which is temporarily energized in response to a series of deenergizations and reenergizations of said line circuit characterizing a particular code for selecting that station, a circuit for energizing said signal control relay including a front contact of such station relay, a slow acting discriminating relay energized in response to continuous energization of said line circuit and also energized in response to intermittent energization of said line circuit to characterize a code but deenergized upon a prolonged deenergization of said line circuit, a stick relay, a pick-up circuit for said stick relay including a front contact of said station relay, a stick circuit for said stick relay including its own front contact and a front contact of said discriminating relay, and a circuit for clearing said signal including front contacts of said stick relay and said signal control relay in series, whereby prolonged opening of said line circuit causes deenergization of said stick relay and actuation of said signal to its stop condition and whereby reenergization of said discriminating relay will not return said signal to its clear condition without the transmission of a code capable of energizing said station relay.

4. In combination, a control office, a distant field station including a section of railway track and a signal for controlling traffic over said section, and a communication system for controlling said signal from said control office comprising; a normally energized line circuit connecting said office and said field station energized by a source of current in said office, means in said office for intermittently deenergizing and reenergizing said line circuit with impulses of distinctive polarities to impress a code thereon including a plurality of successive deenergizations of the line circuit, a signal control relay at said field station for when energized tending to clear said signal, a station relay which is temporarily energized in response to a series of deenergizations and reenergizations of said line circuit by polarities characterizing a particular code for selecting that station, a circuit for energizing said signal control relay including a front contact of such station relay, a slow acting discriminating relay energized in response to continuous energization of said line circuit and also energized in response to intermittent energization of said line circuit by different polarities to characterize a code but deenergized upon a prolonged deenergization of said line circuit, a stick relay, a pick-up circuit for said stick relay including a front contact of said station relay, a stick circuit for said stick relay including its own front contact and a front contact of said discriminating relay, and a circuit for clearing said signal including front contacts of said stick relay and said signal control relay in series, whereby prolonged opening of said line circuit causes deenergization of said stick relay and actuation of said signal to its stop condition and whereby reenergization of said discriminating relay will not return said signal to its clear condition without the transmission of a code capable of energizing said station relay.

5. In combination, a control office, an indicator at said office, a distant field station including a section of railway track and a signal for controlling traffic over said section, and a communication system for controlling said signal from said control office and said indicator in accordance with the condition of said line circuit comprising; a normally energized line circuit connecting said office and said field station energized by a source of current in said office, means in said office for intermittently deenergizing and reenergizing said line circuit with impulses of distinctive polarities to impress a code thereon including a plurality of successive deenergizations of the line circuit, a signal control relay at said field station for when energized tending to clear said signal, a station relay which is temporarily energized in response to a series of deenergizations and reenergizations of said line circuit by polarities characterizing a particular code for selecting that station, a circuit for energizing said signal control relay including a front contact of such station relay, a slow acting discriminating relay energized in response to continuous energization of said line circuit and also energized in response to intermittent energization of said line circuit by different polarities to characterize a code but deenergized upon a prolonged deenergization of said line circuit, a

stick relay, a pick-up circuit for said stick relay including a front contact of said station relay, a stick circuit for said stick relay including its own front contact and a front contact of said discriminating relay, a circuit for clearing said signal including front contacts of said stick relay and said signal control relay in series, and means for causing said indicator to distinctively indicate said intermittent energization and said prolonged deenergization of said line circuit, whereby prolonged opening of said line circuit causes deenergization of said stick relay and actuation of said signal to its stop condition and whereby reenergization of said discriminating relay will not return said signal to its clear condition without the transmission of a code capable of energizing said station relay.

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