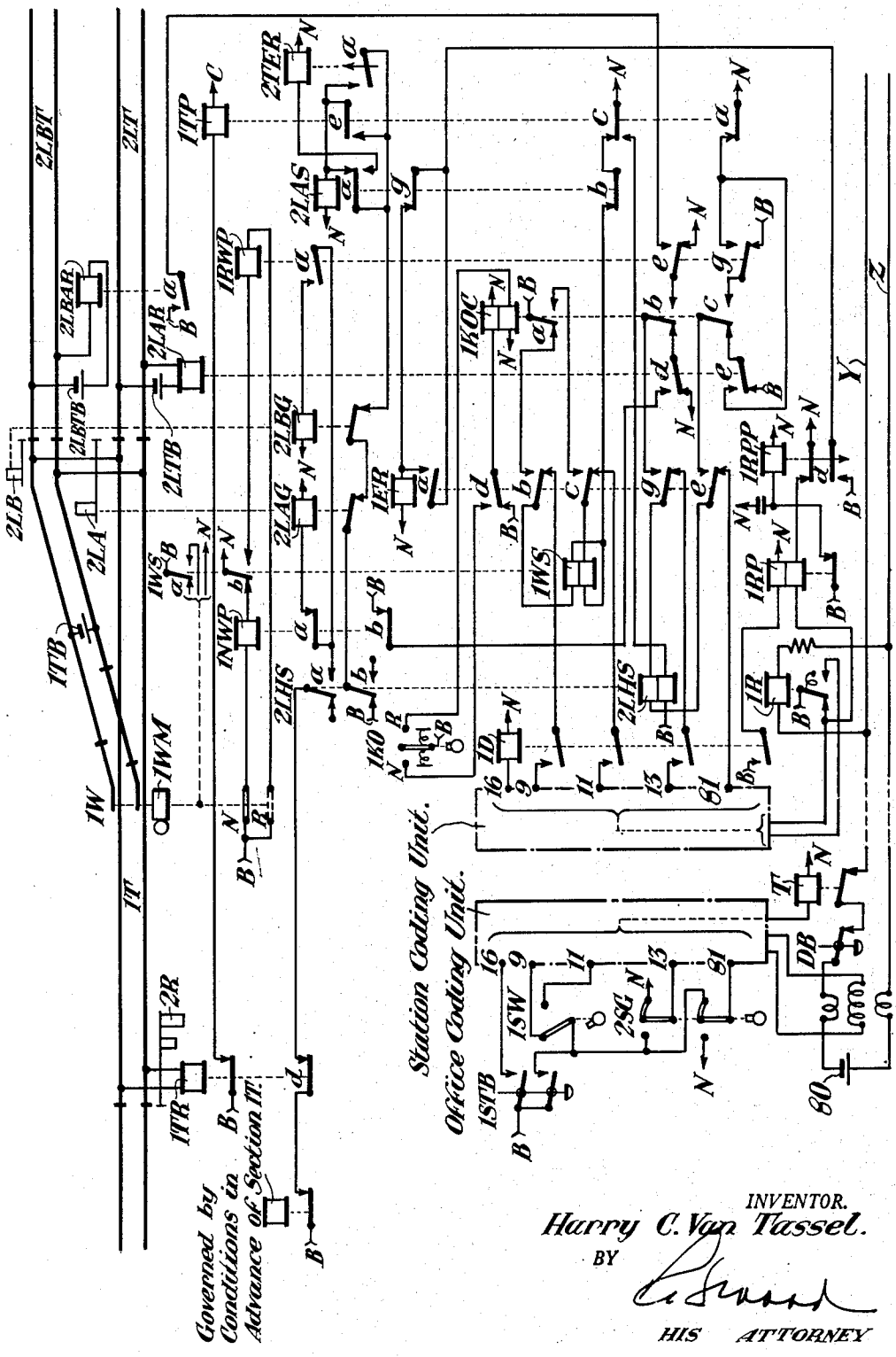
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EMERGENCY CONTROL FOR CENTRALIZED TRAFFIC CONTROL SYSTEMS

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EMERGENCY CONTROL FOR CENTRALIZED TRAFFIC CONTROL SYSTEMS

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My invention relates to emergency control for centralized traffic control systems for the control of traffic movements over single track railroads. This application is a continuation-in-part of my prior application, Serial No. 41,112, filed July 28, 1949.

The principal object of my invention is the provision of means for maintaining centralized traffic control systems in operation for traffic movements under emergency conditions, as for example, in the event of a fault in the communication system for the manual control of traffic movements in the normal operation of the system.

My invention is an improvement upon that shown and claimed in an application for Letters Patent of the United States, Serial No. 752,602, filed on June 5, 1947, by Thomas W. Hays, in which is disclosed a centralized traffic control system which is arranged to revert automatically to a condition suitable for local emergency operation as a result of a failure of the means for communicating with the central office, and in which the communication system when operative may be used to selectively place the apparatus at any station in the emergency condition, enabling the communication system to remain in service for the control of apparatus at other stations.

In the system of this Hays' application, the operation of the signal control relays to enable train movements to be effected under emergency conditions is effected by the operation of push buttons by the crews of trains moving through the territory. This requires that each train must stop at each head block signal, and a member of the train crew must operate a push button in order to set up the system for further movement of his train. One object of my invention is to avoid the stopping of through trains at manually controllable signals when the manual control means for such signals is disabled, by the provision of means effective under the emergency condition for enabling an approaching train automatically to clear the signal in advance as required for its further movement.

A feature of my invention is the provision of means whereby the operation of an emergency relay at each power switch location transfers the control of the power operated switch to a local control relay operable by a lever or push button, so that the train crew may operate the switch by power with less delay than when the switch is operated by a hand throw lever, and with the further advantage that the appropriate signal will clear automatically to permit the train

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to enter or leave a siding at that point as soon as the switch completes its movement.

Another feature of my invention is the provision of means for governing the apparatus for automatically clearing the signals so that it is not effective unless the position of the switch corresponds to the position of this local control relay.

In accordance with a further feature of my invention the local control relay is maintained normally in its normal position so that when the emergency relay is operated the switch will be operated automatically to its normal position to render the approach clearing apparatus effective for through train movements.

In practicing my invention, I provide an emergency relay at the field station which may be selectively energized by opening the communication line circuit for a predetermined interval. When this emergency relay is energized, the circuits for controlling the signals are transferred from the control equipment provided for normally controlling the signals from the remote office, to a system of local circuits which include contacts of relays responsive to the occupancy of adjoining track sections by a train. Accordingly, approach clearing of the signals is provided. That is, under emergency conditions, the signals clear ahead of an approaching train, provided of course that traffic conditions are such as to permit the train to pass the signal. In addition, where a power-operated track switch is provided, the circuits are arranged so that, when the emergency relay is energized, the control of the power switch movement is transferred to local control circuits which will (1) restore the switch to normal if traffic conditions permit and (2) allow the subsequent operation of the switch to be controlled by a manually operated lever located at the switch location.

Briefly stated, the operation of the system involving my invention includes the energization of the emergency relay by the opening of the line circuit, which relay then transfers the signal control relay circuits to a system of local circuits including the contacts of relays operated by trains in adjacent sections, and transfers the switch control relay circuits to a local circuit arrangement including a manually operated lever, to thereby obtain approach clearing of the signals and local control of the power operated track switch.

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

In the accompanying drawing, a track plan of

a typical field station of a centralized traffic control system is shown, corresponding to the left-hand end of a passing siding on a single track railroad, together with circuits and apparatus embodying my invention arranged to control a track switch and the signals which govern traffic movements over the switch in the right to left direction, and in diagrammatic form, the communication apparatus by means of which the switch and signals are manually controllable from a central office. To simplify the circuits, the local sources of current for energizing the various relays are identified by their terminals which are designated B and N, respectively.

The communication system by which the manual control of the switches and signals is effected is to be understood to be a modification of that shown in Letters Patent of the United States, No. 2,411,375, issued November 19, 1946. to Arthur P. Jackel for Remote Control Systems.

The communication system comprises a plurality of control levers and starting buttons associated with coding units at the control office, and corresponding coding units at field stations of which but one of each is shown, as indicated by the legends "Office Coding Unit" and "Station Coding Unit." The office and station coding units are connected by a normally energized circuit including the line wires Y and Z extending from the office to each station. A line relay such as the relay 1R, is connected across the line wires Y and Z at each station, and is normally held energized by current from the battery 88 located at the office. The communication system is normally inactive, but may be set into operation to transmit a control code to a particular station by pressing a starting button such as the button 1STB identifying the desired station. Each control code comprises a series of code elements formed by opening and closing the line circuit by the operation of a transmitter relay T. Each control code includes a group of selecting elements, which operates a delivery relay such as relay 1D at the selected station only, with the same effect as if this relay were energized directly over a contact of the starting button and a wire 16 as indicated diagrammatically in the drawing. Relay 1D when energized prepares circuits over which a series of polar stick control relays are operated to normal or reverse in accordance with the positions of their control levers at the office, in accordance with the character of a second group of elements in the control code. The code responsive control relays at the station include a switch control relay 1WS and a signal control relay 2LHS. Relay 1WS is operable to normal or reverse by impulses supplied over wires 9 and 11, in accordance with the position of a switch lever 1SW, and governs the switch machine 1WM for the track switch 1W. Relay 2LHS is controlled over wires 13 and 81 and governs the clearing of the entering signals 2LA and 2LB, for the single track block extending to the left, in accordance with the position of a signal control lever 2SG. The switch machine 1WM is of the usual dual control type, normally operable by power in accordance with the position of relay 1WS, and also operable by a hand-throw lever, not shown. The track switch 1W and its control relays 1WS jointly control a normal and a reverse switch indication relay 1NWP and 1RWP, contacts of which serve to select signal 2LA or 2LB for clearing in accordance with the direction selected by relay 2LHS and the route established by switch 1W.

Although only signals and associated circuits for traffic movements from right to left are shown and described, it will be understood that traffic movements from left to right may be governed in a similar manner by a provision of a second signal control relay and associated circuits for the control of signal 2R.

It is also to be understood that the communication system includes apparatus for transmitting indication codes for reporting the passage of trains and for indicating the positions of the switches and the condition of the signals, not shown herein.

The main track and the passing siding are equipped with conventional direct current track circuits. The detector section 1T is equipped with a track circuit including the battery 1TB and detector relay 1TR. The main line portion of the passing siding, section 2LT, and the passing track section 2LBT, are each equipped with a track circuit, including a battery, 2LTB or 2LBTB, and a series approach relay, 2LAR or 2LBAR, in addition to the usual track relay at their distant end, not shown. These circuits are adjusted so that the approach relay picks up when a train approaches within a predetermined distance of the battery end of the circuit to thereby indicate the approach of a train. It is to be understood that my invention is not limited to use with conventional direct current track circuits of the type shown and described, but may be employed with signaling systems incorporating other types of track circuits, such as coded track circuits, for example.

The apparatus added to the centralized traffic control system in accordance with my invention comprises a group of relays and a manually operable switch at each of the field stations and as shown for the single field station in the drawing these comprise an emergency relay 1ER, a manually controlled switch control relay 1KOC, and a manually operable switch control lever 1KO. The emergency relay 1ER is provided with a pick-up circuit including a back contact *d* of a station disconnect relay 1RPP controlled by the communication system, and front contact *g* of an approach locking relay 2LAS associated with the signals 2LA and 2LB. Relay 1RPP corresponds to the similarly designated relay shown and described in Letters Patent of the United States, No. 2,376,569, issued May 12, 1945, to George W. Baughman. Relay 1RPP is normally held energized by a repeating relay 1RP of the line relay 1R and is provided with a condenser snubbing circuit by which relay 1RPP is retained normally in its energized position, as shown, unless relay 1R remains in its released position for a period which is greater than any interval occuring in the normal operation of the system, such as five seconds, for example. Relay 1RPP releases automatically following interruption of the communication line circuit due to a fault, and may also be released by the central office operator by opening the disconnect switch DB. Relay 1RPP upon releasing, opens the circuit by which relay 1RP is held energized by relay 1R, and consequently relays 1RP and 1RPP will remain released. After the communication system has been restored to operation, the central office operator is able to reenergize relays 1RP and 1RPP by the transmission of a control code to the corresponding station, relay 1RP being energized by the station delivery relay 1D by which, as shown in the Jackel patent above referred to, the switch and signal control relays

lWS and 2LHS are selected for operation. Relay lRP may also be energized by the transmission of a special recall code without operating any of the control relays, as described in Letters Patent of the United States, No. 2,396,812, issued March 19, 1946, to George W. Baughman.

The approach locking relay 2LAS which has its front contact *g* in the circuit for relay lER is normally held energized in a conventional manner over a stick circuit which extends from terminal N through its winding and over its front contact *a* and contacts of the mechanisms 2LAG and 2BLG for signals 2LA and 2LB which are closed when the signals indicate stop, to terminal B at the normal contact *b* of relay 2LHS. Relay 2LAS has two pick up circuits, one including a back contact *e* of a repeater relay lTP of the track relay lTR, which is closed when signal 2LA or 2LB is put to stop automatically by a train, at which time relay 2LHS is restored to normal to close its contact *b*, by the energization of its lower winding over back contact *c* of relay lTP. The other pick up circuit for relay 2LAS is governed by a time element relay 2TER which is energized over back contact *a* of relay 2LAS whenever signal 2LA or 2LB is put manually to stop, and closes its contact *a* to pick up relay 2LAS after a predetermined time interval such as four minutes. It will be seen that relay 2LAS is released when signal 2LA or 2LB stands at clear and does not pick up immediately upon the return of the signal to stop unless this is due to the passage of a train. Accordingly, if relay lRPP releases when one of the signals has been cleared for an approaching train, relay lER will not become energized until the train enters section lT to put the signal to stop and to pick up relay 2RAS. It follows that when a signal has been cleared by remote control for an approaching train it is maintained at clear following the release of relay lRPP, even though the train has not reached the point at which the approach control is effective. If the train is approaching the usual distant signal in the rear of the manually cleared signal, this distant signal continues to display its proceed indication and the train is not required to reduce its speed. Furthermore, if the route established by the operator is over the switch lW in its reverse position, the switch is maintained reversed until the train has passed over the switch.

When relay lER becomes energized, it completes a stick circuit which includes its front contact *a* and the back contact *d* of relay lRPP, so that it remains energized until relay lRPP is picked up by the reception of a code at the station in question.

Under normal conditions, the emergency relay lER occupies its released position in which its contacts connect the windings of the control relays lWS and 2LHS to the terminals of the station coding unit provided for the code control of these relays, and the control relays therefore are controllable by levers lSW and 2SG as described in the Jackel patent.

The operation of the apparatus of my invention will now be described under different assumed conditions, starting first with the assumption that the emergency relay lER becomes energized when the signaling system is in its normally inactive condition, as shown, with the signals at stop.

When the supply of energy to the winding of relay lRPP is cut off, the relay will release after a time interval. Relay 2LAS is picked up at this

time since signals 2LA and 2LB are at stop and relay 2LHS is in its normal position, and consequently relay lER picks up, and its front contact *a* establishes its stick circuit so that lER continues to be energized as long as relay lRPP remains released.

When relay lER picks up, its contacts *b* and *c* transfer the circuits for the switch control relay lWS from the coding unit terminals 9 and 11, to contact *a* of the local control relay lKOC. Additionally, the front contact *d* of relay lER establishes a connection between the upper winding of relay lKOC and the left-hand contact of lever lKO. This lever is normally biased to a center position, from which it may be operated to a left-hand or right-hand position, designated by the reference characters N and R, respectively. It will be understood that other types of circuit controllers such as push buttons may be used in place of lever lKO if desired.

It will be seen from the drawing that when relay lER releases, relay lKOC is operated to its normal position over a circuit which includes its upper winding and back contact *d* of relay lER. Relay lKOC is of the magnetic stick type, and its contacts stay in the position to which they were last operated, when the relay is deenergized, so that when relay lER picks up the contacts of relay lKOC remain in their normal position. With contact *d* of relay lER picked up, if the lever lKO is operated to the N position or the R position relay lKOC will be energized in such manner as to cause its contacts to move to the normal or the reverse position in accordance with the operation of the lever lKO. Energy is supplied alternately to the upper or lower winding of switch control relay lWS over circuits which may be traced from terminal B over the normal or reverse contact *a* of relay lKOC, front contact *b* or *c* of relay lER, through the upper or lower winding of the switch control relay lWS, over the front contact *b* of relay 2LAS and a front contact *c* of relay lTP to terminal N. Contact *a* of relay lWS supplies energy from terminal B to the switch machine lWM for operating the switch to a position corresponding to that of relay lWS, as indicated diagrammatically in the drawing.

From the foregoing, it will be seen that during the time that the emergency relay lER is picked up, the power switch machine lWM which operates the track switch lW is under the control of the local control lever lKO, so that the switch lW may be operated by power locally to its normal or reverse position, by operation of lever lKO by the trainmen, under the same traffic conditions as those which normally permit its operation by central office control. Furthermore, if the switch lW stands in its reversed position at the time that the emergency relay lER picks up, the switch control relay lWS will be operated automatically to its normal position, if traffic conditions are proper, thereby causing the switch lW to assume its normal position so that through train movements over the main track may continue without the necessity for stopping the train in order to locally restore the switch to normal.

Additionally, when relay lER picks up, its contacts *e* and *g* disconnect the upper winding of the signal control relay 2LHS from the coding unit terminals 13 and 81 over which it is controlled by the lever 2SG, and connect this winding to circuits which govern the relay automatically in accordance with traffic conditions.

Relay 2LHS clears signals 2LA and 2LB by energizing the windings 2LAG and 2LBG of their

mechanisms over circuits shown conventionally in the drawing which extend from terminals N through their windings over front contacts *a* of relays 1NWP and 1RWP respectively, and thence over the reverse contact *a* of relay 2LHS, and front contacts of the track relay 1TR and one or more additional relays governed by traffic conditions in advance of section 1T, to terminal B.

In the event that signal 2LA has been cleared by remote control for a train moving from right to left and the release of relay 1RPP occurs while signal 2LA stands at clear, relay 2LAS will be in its released position and its contact *g* in the pick-up circuit for relay 1ER will be open, so that relay 1ER will remain released and the signal will remain at clear. When the train in question accepts the signal and enters section 1T, the track relay 1TR and its repeater relay 1TP will release. Front contact *d* of relay 1TR will interrupt the circuit for supplying energy to the winding 2LAG for signal 2LA, front contact *c* of relay 1TP will maintain the circuit for relay 1WS open, and back contact *c* of relay 1TP will close the circuit for restoring the relay 2LHS to normal. Relay 2LAS will then be picked up over back contact *e* of relay 1TP, and when contact *g* of relay 2LAS closes, the pick-up circuit for relay 1ER will be completed and the relay will pick up, transferring the control of the relay 2LHS to the local control circuits, but relay 1WS will not be operated until section 1T is vacated, as is obvious. It will be seen therefore, that the deenergization of the relay 1RPP cannot cause any signal which has been cleared to be put to stop in front of an approaching train, nor can it cause the operation of a track switch in front of an approaching train or under a train.

The operation of the apparatus under emergency conditions by approaching trains will now be described, assuming that the relay 1ER is picked up, relay 1KOC being in its normal position, as shown.

If a train is approaching signal 2LA on the main track, moving from right to left, the current supplied from the battery 2LTB to track section 2LT will increase in value until a point is reached where relay 2LAR picks up.

When relay 2LAR picks up, a circuit is established for supplying energy of reverse polarity to the lower winding of relay 2LHS, which circuit may be traced from terminal B at the front contact *b* of relay 1NWP over front contadt *d* of relay 2LAR, over normal contact *b* of relay 1KOC, front contact *g* of relay 1ER, through the upper winding of relay 2LHS from right to left, and thence over front contact *e* of relay 1ER, normal contact *c* of relay 1KOC, front contact *e* of relay 2LAR and front contact *a* of relay 1TP to terminal N. Accordingly, the contacts of relay 2LHS will be operated from their normal to their reverse position. The opening of contact *b* of relay 2LHS releases relay 2LAS, and the closing of the reverse contact *a* of relay 2LHS completes the circuit already traced for the winding 2LAG. Accordingly, it will be seen that if the switch 1W is in its normal position, section 1T unoccupied, and conditions in advance of section 1T are proper, the approach of a train on the main track will cause the circuits to be controlled in such manner as to clear signal 2LA for the approaching train.

When the train passes signal 2LA and occupies section 1T, relays 1TR and 1TP release. When relay 1TP releases, its front contact *c* interrupts the circuit for relay 1WS, so that relay 1WS cannot be operated with a train occupying section 1T. Back contact *c* of relay 1TP completes the circuit for the lower winding of relay 2LHS, and at the same time, front contact *a* of relay 1TP interrupts the circuit for the upper winding of relay 2LHS, so that relay 2LHS is operated to normal. Signal 2LA is accordingly put to stop by the opening of front contact *d* of relay 1TR in the signal circuit, and is held at stop by the opening of contact *a* of relay 2LHS.

When the train moving from right to left vacates section 2LT, the value of current flowing through the winding of relay 2LAR decreases to such an extent that the relay releases. When relay 2LAR is released, a circuit is established for supplying energy of normal polarity to the upper winding of relay 2LHS, which circuit may be traced from terminal B at back contact *e* of relay 2LAR, over normal contact *c* of relay 1KOC, over front contact *e* of relay 1ER, through the upper winding of relay 2LHS from left to right, over front contact *g* of relay 1ER, over normal contact *b* of relay 1KOC, and over back contact *d* of relay 2LAR to terminal N. Thus relay 2LHS is supplied with energy at this time of such polarity that it is held in its normal position.

It will be seen therefore, that when signal 2LA has been cleared by the approach of a train in section 2LT, it is restored to stop when the train vacates this section even though the train does not occupy section 1T.

Assuming however, that the train continues its movement from right to left from section 2LT through section 1T, when the train vacates section 1T, relays 1TR and 1TP pick up. Contact *c* of relay 1TP again completes the circuit for the switch control relay 1WS, and opens the restoring circuit of relay 2LHS. Relay 2LHS is retained in its normal position by energy supplied over the circuit traced above, including the back contacts *d* and *e* of relay 2LAR.

From the foregoing it will be seen that a train approaching signal 2LA on the main track, when the communication system is disabled, will automatically clear the signal 2LA in advance of the train so that the train movement may be continued.

Assuming now that an approaching train is on the siding section 4LBT and that the train crew have authority to move the train from right to left from the siding to the main track, after stopping at signal 2LB one of the trainmen will operate the manual control lever 1KO momentarily to its R position. When lever 1KO is reversed, a circuit is established for reversing the contacts of relay 1KOC, and as a result, relay 1WS assumes its reverse position, releasing relay 1NWP and causing the switch movement 1WM to operate switch 1W to its reversed position, and then the reverse switch repeater relay 1RWP becomes energized. Since the train is occupying section 2LBT, the series approach relay 2LBAR is picked up, consequently when relay 1RWP picks up a circuit is established for reversing the signal control relay 2LHS, which extends from terminal B at front contact *a* of the relay 2LBAR, front contact *e* of relay 1RWP, reverse contact *b* of relay 1KOC, front contact *g* of relay 1ER, through the upper winding of relay 2LHS from right to left, thence over front contact *e* of relay 1ER, reverse contact *c* of relay 1KOC, front contact *g* of relay 1RWP, and front contact *a* of relay 1TP to terminal N. As a result, the contacts of relay 2LHS are operated to their reverse position. Relay 2LAS releases and

thereby locks switch 1W reversed, and since relay 1RWP is now picked up, a circuit is established for mechanism 2LBG, causing signal 2LB to indicate proceed so that the train on the siding may leave the siding. When the train passes signal 2LB and enters section 1T, the relays 1TR and 1TP release, restoring the signal control 2LHS to its normal position, opening the signal control circuit at front contact *d* of relay 1TR, and also opening the circuit for controlling the switch control relay 1WS, so that the switch 1W cannot be operated until the train vacates section 1T. If an approaching train now enters the main track section 2LT, signal 2LA will not clear automatically as hereinbefore described, due to the fact that the switch 1W and its control relays stand reverse.

In this case the switch 1W may be restored to its normal position and signal 2LA cleared by the operation of the lever 1KO. When the lever 1KO is placed in the N position, the contacts of relay 1KOC are restored to normal and if the locking conditions permit its operation, the switch control relay 1WS operates its contacts to its normal position, the operation of its contact *b* causing relay 1RWP to release, and the operation of its contact *a* supplying energy to the switch machine 1WM to restore switch 1W to normal, whereupon relay 1NWP becomes energized.

Since relay 2LAR is now energized due to the presence of the train in section 2LT, and since the left-hand contacts of relay 1KOC are closed, relay 2LHS is operated to reverse as soon as the switch assumes its normal position, due to the closing of contact *b* in the circuit for relay 2LHS which includes the front contacts *d* and *e* of relay 2LAR, and relay 2LHS then releases relay 2RAS and clears signal 2LA in the manner already described.

From the foregoing, it will be seen that during the time that the emergency relay 1ER is picked up, the switch 1W is free to be operated by the manual control lever 1KO under proper traffic conditions to set up a route for a train standing either on the side track or the main track, and that when the switch is properly positioned, the presence of a train in the approach section will operate the circuits to clear the signal to enable the train to move over the switch.

Although I have herein shown and described only one form of my invention, it is to be understood that various changes and modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of my invention.

Having thus described my invention, what I claim is:

1. In a centralized traffic control system for a stretch of railway track including a track section having a track relay and an approach section having an approach relay each adapted to detect the presence of a train in its section, said system including a signal for governing the movement of traffic from said approach section into said track section, together with a signal control relay for governing the clearing of said signal, a communication circuit extending to a control office over which said signal control relay is manually controllable from said office, said system also including means controlled by said track relay for restoring the signal control relay automatically to normal when said track section is occupied by a train, the combination of the foregoing with an emergency relay, means for operating said emergency relay effective when said communication circuit is disabled so as to prevent the manual control of said signal control relay, means controlled by said emergency relay in its operated position for rendering said signal relay responsive to the operation of said approach relay to effect the clearing of said signal automatically upon the approach of a train, and means for delaying the operation of the emergency relay if said communication circuit becomes disabled when the signal has been cleared by manual control, until the signal control relay has been restored automatically to normal by the release of said track relay.

2. In a centralized traffic control system for a stretch of railway comprising a detector section including a power operated track switch and equipped with signals for governing the movement of traffic over the routes established by the switch in its respective normal and reverse positions, said system including a track relay for detecting the presence of a train in said section and switch indication means for selecting one signal or the other for clearing in accordance with the position of the switch, said system also including a switch control relay for operating the track switch and a signal control relay for clearing the selected signal and having a communication circuit extending to a control office over which said control relays are manually controllable from said office, the combination with the foregoing of an emergency relay, means for operating said emergency relay effective when said communication circuit is disabled so as to prevent the manual control of said control relays, a local switch lever at the switch location, means controlled by said emergency relay in its operated position for rendering said switch control relay responsive to the operation of said switch lever and for preparing local operating circuits for said signal control relay, and means controlled by said switch lever for completing one of said prepared circuits to effect the clearing of the signal for the route selected by the operation of said switch lever.

3. A centralized traffic control system of the type recited in claim 2, in which the means for governing the switch control relay by the local lever comprises a local relay of the stay-whereput type, and in which the local operating circuits prepared for the signal control relay by the emergency relay are completed over contacts of the local control relay only when the switch assumes a position corresponding to that of said contacts.

4. A centralized traffic control system of the type recited in claim 2, in which the signals govern movements over the switch in the trailing direction and the tracks adjoining the detector section on the trailing side are provided with approach relays for detecting the presence of trains approaching said signals, and in which the local operating circuits for the signal control relay are completed by the approach relay only when there is a train in approach to the signal selected by the local control relay.

5. In a centralized traffic control system for the control of a power operated track switch located in a detector track section and having signals for governing the movement of traffic through said section, said system including a track relay for said section, an approach locking relay controlled by the signals in their stop positions and a switch control relay for operating the switch, said switch control relay being operable only when said track and approach locking relays are energized, said system also including a com-

munication circuit extending to a control office over which said switch control relay is manually controllable from said office, the combination with the foregoing of an emergency relay, a local control relay, a switch lever at the switch location, means for operating said emergency relay effective when said communication circuit is disabled so as to prevent the control of said switch control relay from said office, means controlled by said emergency relay in its operated position for rendering said switch control relay responsive to the operation of said local control relay, and for rendering said local control relay operable to normal or reverse in response to the operation of said switch lever, and means controlled

by said emergency relay for maintaining said local relay in its normal position when said emergency relay is in its normal position.

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