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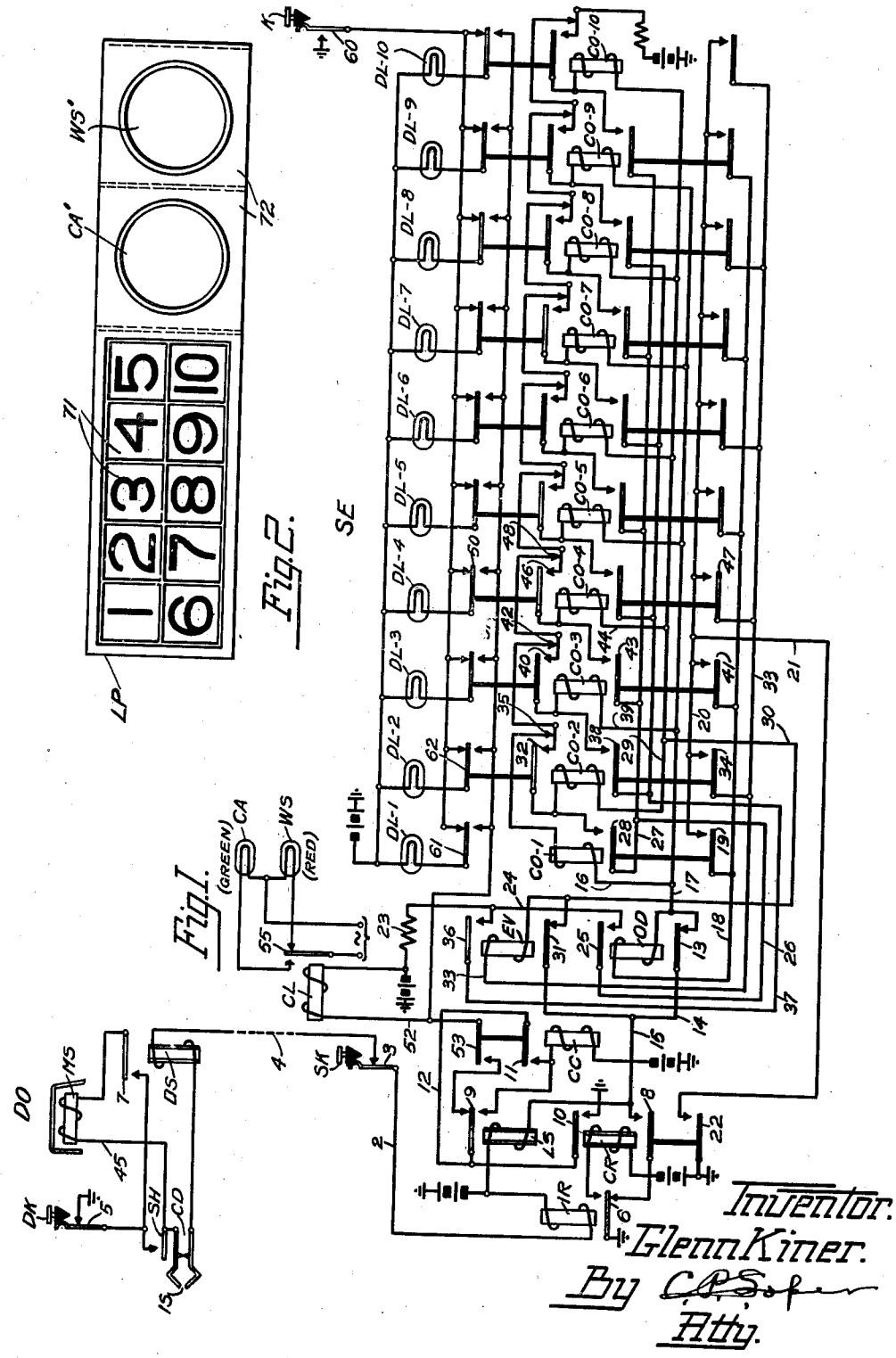

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TRAIN DISPATCHER SIGNAL SYSTEM

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This invention relates to a signaling system, being concerned more particularly with a signaling system suitable for use by a dispatcher who controls the disposition of incoming vehicles.

The principal object of the invention is the provision of a new and improved signaling system controlled by a dispatcher to display signals indicative of the disposition to be made of vehicles incoming to a station or terminal.

A further object is the provision of additional signal equipment which displays a signal, readily discernible from a distance by the operator of an approaching vehicle, indicating whether or not a specific signal is displayed indicating the disposition of an incoming vehicle.

A further object is a provision of means within a signaling system (particularly useful when the dispatcher station is either remote from, or otherwise out of sight of, the path taken by the incoming vehicles) enabling the operator or attendant of an incoming vehicle to signal the dispatcher that the vehicle has arrived, thus informing the dispatcher that he may reset the signals to indicate the disposition to be made of the next incoming vehicle.

It is a further object of the invention to exercise all of the controls incident to the setting and effacing of the signals, both for the operators or attendants of the vehicles and for the dispatcher, over a single control circuit.

Although the invention herein disclosed is suitable for use in signaling the disposition of a wide variety of incoming vehicles (passenger cars incoming to a storage garage, trucks incoming to a freight terminal, passenger trains arriving at a railway station, etc.) and may be used to advantage in other situations, the illustrated embodiment of the invention is particularly applicable to signaling to the engineer and brakemen of freight trains arriving successively at a terminal the particular siding or switch track that each such incoming train is to occupy.

A feature of the invention is that a single-wire, ground-return circuit is provided between a dispatcher station and a remotely located signal station, the latter being located adjacent the incoming railway line, preferably a sufficient distance in advance of the location of the switch tracks that the engineer and brakemen of the arriving freight trains are informed of the disposition to be made of the respective trains before the terminal or switchyard is reached.

A further feature of the arrangement is that the dispatcher assigns the sidings by "dialing" the corresponding number on a simple telephone type of calling device.

It is a further feature of the arrangement that the dispatcher's control circuit is prepared for the reception of signals from the calling device responsive to the turning of the dial thereof from its normal position incident to the operation thereof.

A further feature of the arrangement is that the simple act of operating a push button on the part of one of the brakemen of an arriving train resets the signal equipment to normal position and signals the dispatcher that the train to which he has assigned a siding has arrived.

The foregoing and other objects and features of the invention will become more apparent as the description progresses.

In the accompanying drawing:

Fig. 1 illustrates the circuit arrangement of the signal system; and

Fig. 2 illustrates a lamp panel containing the designating lamp signals.

Referring to Fig. 2, there is shown a lamp panel structure LP having ten compartments 71 for the signal lamps DL—1 to DL—10, respectively, and two larger compartments 72 for the signal lamps CA and WS. The cover 72 may have windows 1 to 10 of suitable translucent material, with the numbers 1 to 10 thereon of sufficient size to permit the same to be clearly legible from an approaching train. The portion of the cover for compartments 72 has lenses CA' and WS', preferably green and red, respectively, of sufficient size to be visible from a distance along the track.

Referring now to Fig. 1, there is illustrated in the upper left hand corner a dispatcher signal control circuit DO, comprising a rotatable, telephone type of calling device CD, a mechanical signal MS of any suitable type, a dispatcher's "break" key DK, and a dispatcher's signal control relay DS which controls the operation of the mechanical signal MS.

The signal equipment SE, remote from the dispatcher's station, includes designating lamp signals DL—1 to DL—10, and the clear-signal and warning signal lamps, CA and WS, respectively. Equipment SE also includes the illustrated relay equipment, and the interrupter or "clear-out" key SK.

The apparatus for controlling the operation of the designating lamp signals is controlled over signal line 4, and it includes an impulse relay IR actuated by the pulse interruptions from the calling device at the dispatcher's station and in

combination with a control relay CR effects alternate operations of the "odd" and "even" relays OD and EV as the relay IR is successively deenergized and energized a predetermined number of times to successively operate the counting relays CO—1 to CO—10 of the counting relay chain and in combination with a signal-control relay LS and clear-signal-control relay CC, controls the lighting of a selected one of the designating lamp signals DL—1, DL—2, etc., at the termination of the impulse interruptions from the calling device at the dispatcher's station DO.

The clear-signal-control relay CC and the clear-line signal relay CL control the operation of the clear-signal lamp CA, visible from afar, to indicate to the engineer of the incoming train that one of the lamps DL—1 to DL—10 is lighted to designate a vacant siding. A key K is provided for testing the associated designating lamp signals.

Let it be assumed that the dispatcher at the dispatcher's station DO desires to assign vacant track siding No. 4 to the next train to arrive at the switchyard. The calling device CD at the dispatcher's station is operated in accordance with the digit 4 to produce a series of four interruptions of its impulse springs IS.

The rotation of the calling device CD from its normal position permits the off-normal, or shunt, spring SH to move to its closed position to establish a ground-return energizing circuit for the impulse relay IR of the distant signal equipment SE in series with relay DS at the dispatcher's station DO. This circuit is traced from battery through the relay IR, conductor 2, closed contact 3 of the switchman's interrupter key SK, conductor 4, the winding of the dispatcher's signal-control relay DS, the normally closed impulse springs IS, the now-closed shunt springs SH, to ground at the normally closed contact 5 of the dispatcher's interrupter key DK. Relays IR and DS are operated over this circuit. The closing of front contact 6 of relay IR closes an energizing circuit for the control relay CR. Relay DS at the dispatcher's office, upon energization, closes a locking circuit for itself, and prepares a circuit for the dispatcher's signal MS, but the signal MS is shunted by spring SH during the sending of impulses.

The first interruption of the impulse springs IS, as the rotated member of the calling device CD returns toward normal position, opens the circuit of relays IR and DS. Relay IR promptly restores, but relay DS, being slow to release, remains operated throughout the entire series of rapid interruptions of the impulse springs IS. The front contact 6 of relay IR opens the energizing circuit for the relay CR, but relay CR, being slow to release, also remains operated throughout the series of impulses. Upon the first momentary deenergization of relay IR, control relay LS is energized from battery through relay LS, front contact 8 of relay CR, to ground at the back contact 6 of relay IR. Relay LS thereupon operates, and, being slow to release, remains operated throughout the series of impulses. Front contact 9 of relay LS closes an energizing circuit for the clear-signal-control relay CC, from battery through relay CC, front contact 9 of relay LS, to ground at front contact 10 of relay CR. Relay CC operates, and at its front contact 11, closes a locking circuit for itself independent of the front contact 9 of relay LS. Relay CC prepares a circuit for the clear-signal-closing relay CL which is not completed until the end of the series of impulses.

Also, upon the first momentary restoration of relay IR, the back contact 6 of the deenergized relay IR closes a circuit for the counting relay CO—1 of the counting relay chain, from battery through the series of closed contacts of the counting relays CO—10 to CO—2, through the winding of relay CO—1, back contact 13 of the "odd" impulse relay OD, conductors 14 and 15, front contact 8 of relay CR, to ground at the back contact 6 of relay IR. Relay CO—1 is operated over this circuit, and, at contact 19, closes a locking circuit for itself in series with relay OD, independent of back contact 6 of relay IR. Relay OD, however, does not operate during the impulse for it is shunted by the initial circuit of relay CO—1.

At the end of the first interruption, relay IR reoperates, opening the initial energizing circuit of the counting relay CO—1. Relay CO—1 remains operated, and relay OD now operates in the following locking circuit: from battery through the series back contacts of relays CO—10, CO—9, etc., the winding of relay CO—1, conductors 16 and 17, the winding of relay OD, conductor 18, front contact 19 of relay CO—1, conductors 20 and 21, to ground at front contact 22 of relay CR. At contact 13, relay OD opens a further point in the initial energizing circuit of relay CO—1, and at contact 25 it prepares an energizing circuit for the next counting relay CO—2.

The next restoration of relay IR closes a circuit for the counting relay CO—2, from battery by way of resistor 23, conductor 24, front contact 25 of relay OD, conductors 26 and 27, front contact 28 of relay CO—1, winding of relay CO—2, conductors 29 and 30, back contact 31 of the "even" impulse relay EV, conductor 15 and front contact 8 of relay CR, to ground at the back contact 6 of relay IR. Relay CO—2 is energized over this circuit to close a locking circuit for itself in series with relay EV, which latter relay remains shunted until the impulse subsides. Relay CO—2 also open-circuits and restores relays CO—1 and OD at contact 35, while at contact 32 it connects the upper winding terminal of relay CO—2 into the battery-supply contact chain. When relay IR reoperates at the end of the second impulse, it opens the initial energizing circuit of relay CO—2, but relay CO—2 remains operated, and relay EV operates over the following locking circuit: from battery through the series back contacts of relay CO—10, CO—9, etc., the front contact 32 of relay CO—2, winding of relay CO—2, conductors 29 and 30, winding of relay EV, conductor 33, front contact 34 of relay CO—2, and conductors 20 and 21, to ground at front contact 22 of relay CR.

The next restoration of relay IR closes a circuit for the counting relay CO—3: from battery by way of resistor 23, conductor 24, front contact 36 of relay EV, conductor 37, front contact 38 of relay CO—2, winding of relay CO—3, conductors 39 and 17, back contact 13 of relay OD, conductors 14 and 15, and the front contact 8 of relay CR, to ground at the back contact 6 of relay RI, relay CO—3 operates over this circuit, to lock itself in series with relay OD at contact 34, and to cut its winding into the battery-supply counting chain at contact 40, at the same time opening contact 42 to restore relays CO—2 and EV. At the end of the third pulse, relay RI is

If the dispatcher wishes to recall a track assignment, the operation of the key DK will temporarily interrupt the series circuit through relays IR and DS and the signal MS, and the restoration of the apparatus and signals will occur as described.

From the foregoing description, it is apparent that the lighting of a predetermined designating signal lamp DL to illuminate any number 1 to 10, Fig. 2, depends upon the number of impulses transmitted by the calling device CO at the dispatcher's station DO. The operation of the apparatus to light any desired one of these designating signal lamps occurs in the manner described.

The self-restoring, lamp-test, key K, when actuated, closes a circuit for the designating signal lamps DL—1, DL—2, etc. The closing of the make contact 60 of the key lights the lamps through the normally closed contacts 61, 62, etc. Any lamps failing to light when key K is actuated may be replaced.

Having thus described my invention, what I claim is new and desire to secure by United States Letters Patent:

1. In a dispatcher signaling system including a dispatcher station and a signal receiving station having receiving equipment operative to receive and display a signal indicative of any one of a number of series of current interruptions, a signal circuit extending between said stations, said circuit being normally closed through a source of signaling current except for an open point at the dispatcher station, there being a dial type of calling device or signal-circuit interrupter at said dispatcher station, means including normally open off-normal contacts at said calling device for closing said open point when the dial of the calling device is rotated pursuant to the transmission of a series of momentary interruption signals to the receiving station, means in said receiving equipment responsive to such closure for preparing to receive and display a signal responsive to the series of circuit interruptions that is to follow, means comprising a relay in the signal line having self locking contacts in shunt of said off-normal contacts for maintaining said circuit closed after the off-normal contacts of the calling device open when the dial is returned to normal position at the end of the series of circuit interruptions, an electromagnetic mechanical display device connected in series with said self-locking contacts and operable after the calling device dial is returned to normal position to indicate thereafter that a series of interruption signals has been transmitted, and two self-restoring break keys located at said stations, respectively, said self-locking relay restoring responsive to an operation of either of said keys to unlock itself to thereby maintain the signal circuit open until the dispatcher again operates the calling device, said mechanical display device thereupon restoring to indicate that the signal system has been cleared of the last transmitted signal, the receiving equipment clearing out responsive to the operation of either said key to efface the displayed signal and to prepare to receive a further series of interruption signals.

2. In a dispatcher signaling system including a dispatcher station and a signal receiving station having receiving equipment operative to receive and display a signal indicative of any one of a number of series of current interruptions, a signal circuit extending between said stations, said circuit being normally closed through a source of signaling current except for an open point at the dispatcher station, there being a dial type of calling device or signal-circuit interrupter at said dispatcher station, means including normally open off-normal contacts at said calling device for closing said open point when the dial of the calling device is rotated pursuant to the transmission of a series of momentary interruption signals to the receiving station, means in said receiving equipment responsive to such closure for preparing to receive and display a signal responsive to the series of circuit interruptions that is to follow, means comprising a relay in the signal line having self-locking contacts in shunt of said off-normal contacts for maintaining said circuit closed after the off-normal contacts of the calling device open when the dial is returned to normal position at the end of the series of circuit interruptions, and means thereafter effective for temporarily opening the signal circuit, said self-locking relay thereupon restoring to unlock itself and thereby maintain the signal circuit open until the dispatcher again operates the calling device, the receiving equipment clearing out responsive to the signal circuit being maintained open.

3. In a dispatcher signaling system including a dispatcher station and a signal receiving station having receiving equipment operative to receive and display a signal indicative of any one of a number of series of current interruptions, a signal circuit extending between said stations, said circuit being normally closed through a source of signaling current except for an open point at the dispatcher station, there being a dial type of calling device or signal-circuit interrupter at said dispatcher station, means including normally open off-normal contacts at said calling device for closing said open point when the dial of the calling device is rotated pursuant to the transmission of a series of momentary interruption signals to the receiving station, means in said receiving equipment responsive to such closure for preparing to receive and display a signal responsive to the series of circuit interruptions that is to follow, means comprising a relay in the signal line having self-locking contacts in shunt of said off-normal contacts for maintaining said circuit closed after the off-normal contacts of the calling device open when the dial is returned to normal position at the end of the series of circuit interruptions, and means thereafter effective for temporarily opening the signal circuit at the receiving station, said self-locking relay thereupon restoring to unlock itself and thereby maintain the signal circuit open until the dispatcher again operates the calling device, the receiving equipment clearing out responsive to the signal circuit being maintained open.

4. In a dispatcher signaling system including a dispatcher station and a signal receiving station having receiving equipment operative to receive and display a signal indicative of any one of a number of series of current interruptions, a signal circuit extending between said stations, said circuit being normally closed through a source of signaling current except for an open point at the dispatcher station, there being a dial type of calling device or signal-circuit interrupter at said dispatcher station, means including normally open off-normal contacts at said calling device for closing said open point when the dial of the calling device is rotated pursuant to the transmission of a series of momentary interruption signals to the receiving station, means in said receiving equipment responsive to such clo-

again energized to open the initial energizing circuit of relay CO—3, but relay CO—3 remains operated, and relay OD operates, in the following locking circuit: from battery through the series back contacts of relays CO—10, CO—9, etc., the front contact 40 of relay CO—3, winding of relay CO—3, conductors 39 and 17, winding of relay OD, conductor 18, front contact 41 of relay CO—3, and conductor 21, to ground at front contact 22 of relay CR.

The next and final momentary restoration of relay IR closes a circuit for the counting relay CO—4: from battery, resistor 23, conductor 24, front contact 25 of relay OD, conductors 26 and 27, front contact 43 of relay CO—3, winding of relay CO—4, conductors 44 and 30, back contact 31 of relay EV, conductor 15, and the front contact 8 of relay CR, to ground at the back contact 6 of relay IR. Relay CO—4 is energized over this circuit to lock itself and to restore relays OD and CO—3.

At the end of the fourth pulse interruption, the dial of the calling device CD has returned to normal position, to open the shunt spring contact SH. Spring SH removes the shunt from the dispatcher's signal MS. Signal MS now operates in the following locking circuit of relay DS: from battery through relay IR, conductor 2, key SK, conductor 4, relay DS, contacts IS, conductor 45, the winding of the signal MS, and front contact 7 of relay DS, to ground at the closed contact 5.

In the equipment SE, relay IR, upon reoperating at the end of the fourth interruption, interrupts the initial energizing circuit of relay CO—4, but relay CO—4 remains operated, and relay EV operates, in the following locking circuit: from battery through the series back contacts of relays CO—10, CO—9, etc., the front contact 46 of relay CO—4, winding of relay CO—4, conductors 44 and 30, winding of relay EV, conductor 33, front contact 47 of relay CO—4, and conductors 20 and 21, to ground at the front contact 22 of relay CR.

When relay IR remains operated to signal the end of the impulse series, slow releasing relay LS restores. The closing of back contact 9 completes a circuit for the selected designating lamp signal DL—4 from battery, through the lamp DL—4, front contact 50 of relay CO—4, conductor 51, front contact 53 of locked relay CC, back contact 9 of relay LS, and conductor 12, to ground at front contact 10 of relay CR. The lamp signal DL—4 is lighted and illuminates the numeral 4 in the lamp panel box LP, shown in Fig. 2. The closing of back contact 9 of relay LS also closes a circuit for the relay CL from battery through the winding of relay CL, conductor 52, front contact 53 of relay CC, back contact 9 of relay LS, and conductor 12, to ground at front contact 10 of relay CR. Relay CL, at its contact 55, extinguishes the warning-signal lamp WS and lights the clear-signal lamp CA. Lamps WS and CA are preferably powerful lamps, lighted from the usual commercial A. C. power source, so as to be visible for a long way from an incoming train. The lamps WS and CA are preferably of distinctive colors, such as red and green, respectively. The lighted lamp CA now gives the "clear" signal to the engineer of the next incoming train, and the illuminated numeral 4, Figure 2, designates the siding track to be used.

The disptacher's signal MS is operated over the circuit which includes relays IR and DS, as above described, and this mechanical signal gives the dispatcher a continual visual indication that a siding has been selected and a clear signal is being displayed for the next incoming train.

In the use of the illustrated embodiment of the signaling system, it is contemplated that two of the brakemen customarily employed on a freight train will be in the fore part of the train as it comes into the vicinity of the terminal. It is also contemplated that the duty of the first brakeman will be to alight from the slowly moving train, as it passes the signaling station, to acknowledge the signal to the dispatcher to inform him of the arrival of the train, while the contemplated duty of the second brakeman is to alight when the slowly moving train approaches the switch leading to the signaled siding and proceed ahead of the train to operate the switch. It will be obvious, of course, that these specific arrangements may be altered where the circumstances are somewhat different and that the above contemplated arrangements are set forth for illustrative purposes only.

Assume now that a freight train approaches the signal station SE. While the train is still some distance away, the engineer and the brakemen may observe the green-light signal given by the lighted lamp CA and displayed through the green lens CA' (Fig. 2). Because the signal lamp CA (Fig. 1), is a comparatively powerful lamp, shining through the comparatively large lens CA' (Fig. 2), the green signal is visible over a much greater distance than are the track signals 1 to 10 (Fig. 2), lighted respectively by lamps DL—1 to DL—10. When the train closely approaches the signaling station, the engineer and the brakemen may perceive which of the numbers 1 to 10 of Fig. 2, is lighted, No. 4 in the present example.

After proceeding slowly past the signal station to permit the first brakeman to alight, the train may proceed to the designated No. 4 siding in the usual manner.

The brakeman left at the signaling station may now actuate the self-restoring signaling key SK to temporarily open its contacts 3 to signal the dispatcher that the train which track 4 was assigned has now arrived and is proceeding to the assigned rack.

When the signaling key or push button SK, Fig. 1, is actuated as above noted, the series circuit through relays IR and DS and dispatcher's signal MS is interrupted. Signal MS restores to notify the dispatcher that the train for track No. 4 has arrived and that another track signal can be set up for the next train to arrive.

Relay DS, upon restoring, disconnects signal MS to open-circuit the signal line 4 at another point, thus preventing a resumption of current flow over this line responsive to the release of key SK by the switchman.

In the signal station SE, the restoration of relay IR, and the opening of its front contact 6 allows relay CR to restore. Front contact 22 removes ground from conductor 21 to allow any operated ones of relays EV, OD and CO—1 to CO—10 to restore. Contact 8 opens the impulse circuit, and contact 10 open-circuits relays CC and CL. Relay CL restores, effacing the green clear signal CA, and lighting the red warning signal WS.

In the event that another incoming train now approaches, the engineer thereof is warned by the red light through lens WS', Fig. 2, that he must wait for a siding assignment number. Ordinarily, however, the dispatcher will have reoperated the signal equipment to assign a new siding or track by the time the next train arrives.

sure for preparing to receive and display a signal responsive to the series of circuit interruptions that is to follow, means comprising a relay in the signal line having self-locking contacts in shunt of said off-normal contacts for maintaining said circuit closed after the off-normal contacts of the calling device open when the dial is returned to normal position at the end of the series of circuit interruptions, means thereafter effective for temporarily opening the signal circuit, said self-locking relay thereupon restoring to unlock itself and thereby maintain the signal circuit open until the dispatcher again operates the calling device, the receiving equipment clearing out responsive to the signal circuit being maintained open, and a signal at the dispatcher station for displaying an indication depending upon whether the signal circuit is open or closed.

5. In a signaling system for use in connection with a terminal having separate receiving locations for incoming vehicles, specific signal display means located along the path of vehicles incoming to the terminal, a dispatcher station remote from said display means, control means associated with the display means and operable from the dispatcher station to cause said display means to display successive specific signals indicative respectively of the receiving locations to which successive incoming vehicles are to proceed, general display means located in association with the first-named display means and comprising a warning-signal device and a clear-signal device, means normally effective for causing said warning-signal device to display a distinctive warning signal indicating that no receiving location has been assigned to the next incoming vehicle, and means responsive to the control exercised from the dispatcher station in causing any of said specific signals to be displayed for erasing said warning signal and causing said clear-signal device to display a distinctive clear signal indicating that the first-named display means is then displaying a receiving-location signal.

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