Dec. 6, 1938. R. M. PHINNEY 2,138,878

RAILWAY TRAFFIC CONTROLLING SYSTEM

Filed Aug. 29, 1936 2 Sheets-Sheet 1

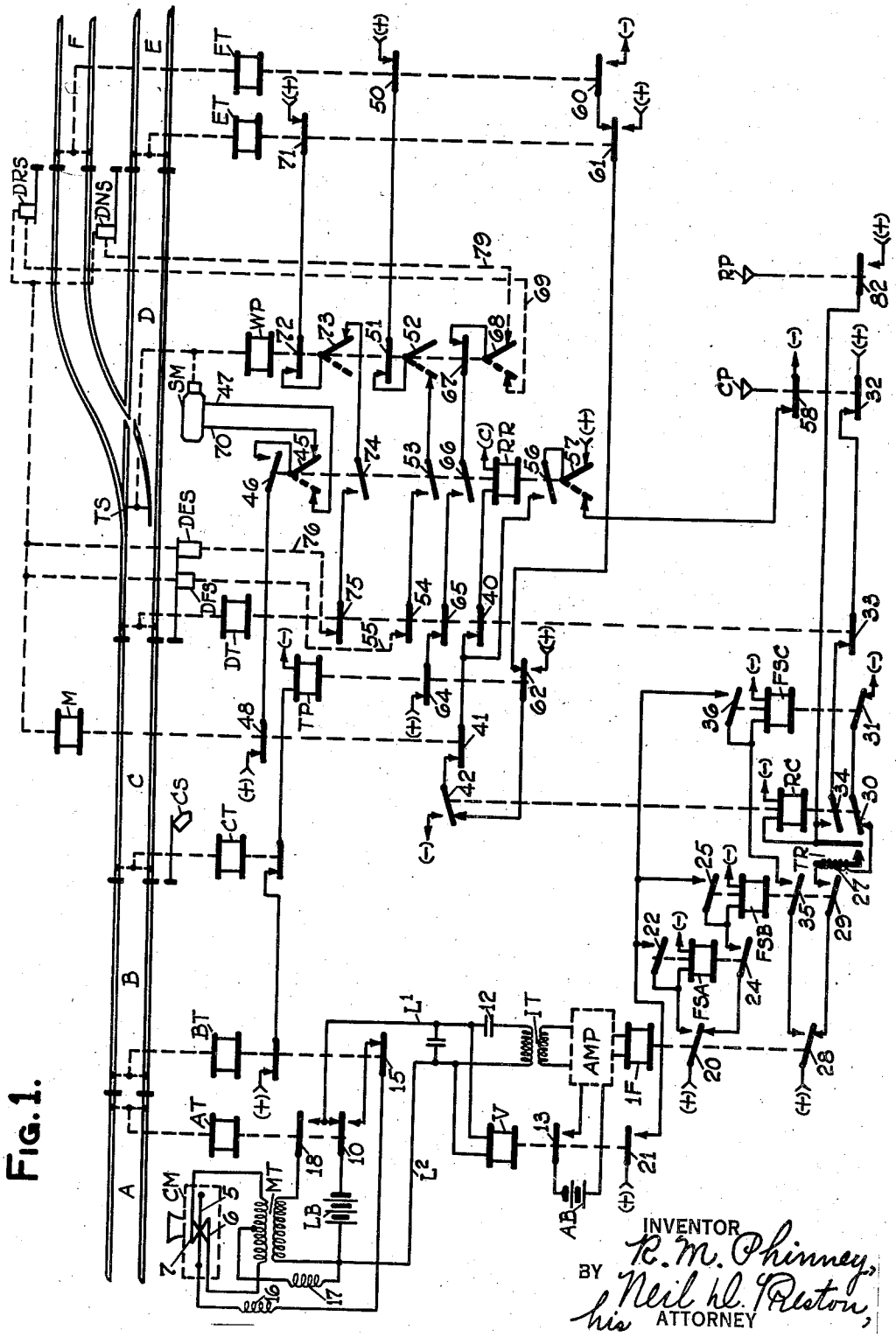


FIG. 1.

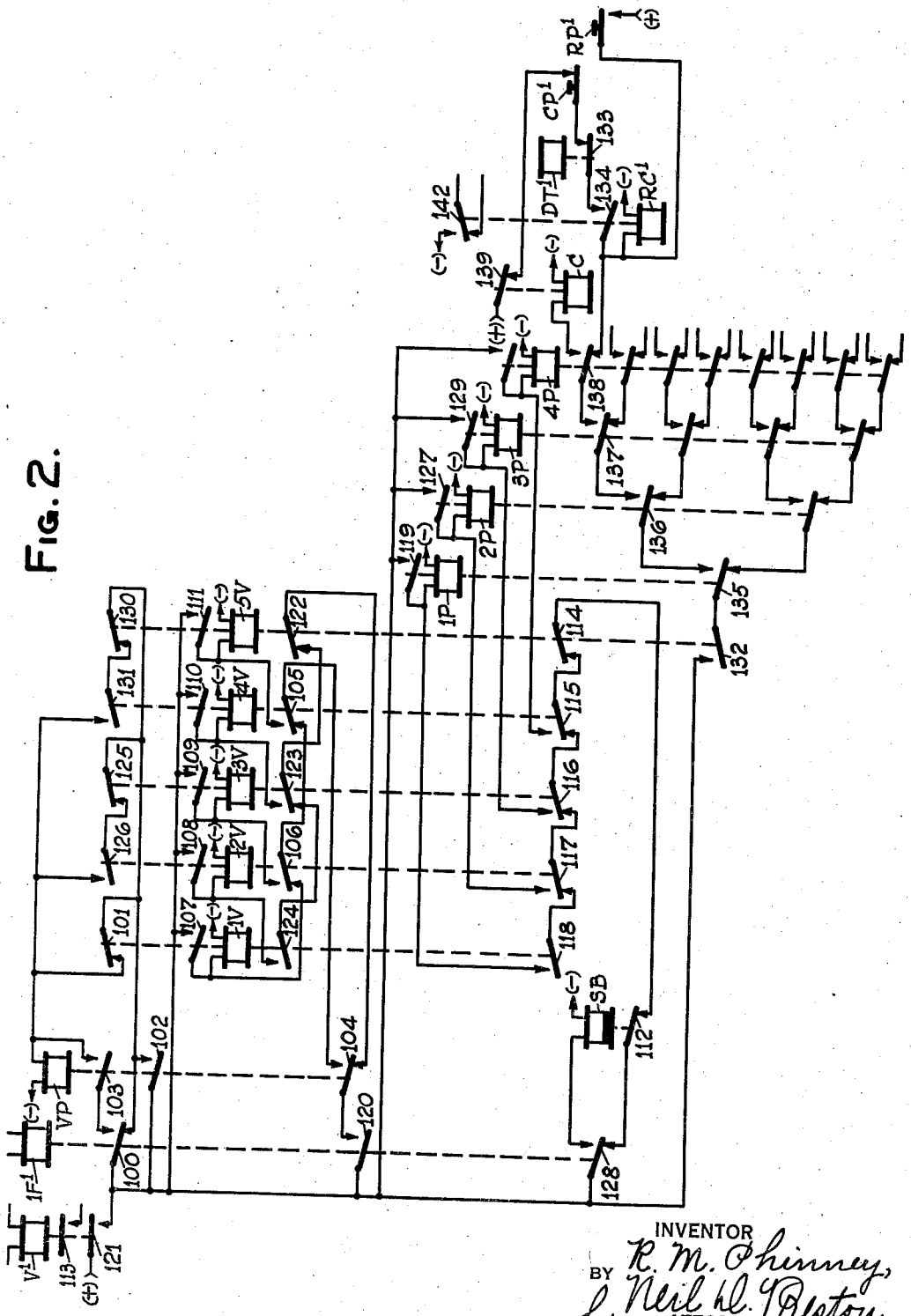
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FIG. 2.



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RAILWAY TRAFFIC CONTROLLING SYSTEM

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Application August 29, 1936, Serial No. 98,545

12 Claims. (Cl. 246—3)

This invention relates in general to railway traffic controlling systems, and more particularly to a system permitting various traffic routes to be selectively established by the engineer of an approaching train.

In general, it is proposed in accordance with the present invention to provide a means operable from the cab of a locomotive to selectively establish various routes over a railway track layout. More specifically, it is proposed to provide an arrangement of trackway apparatus and circuits responsive to whistle signals of a locomotive to accordingly align traffic routes. It is also proposed to provide an arrangement of trackway apparatus and circuits which may be distinctively conditioned by a coded series of whistle blasts to selectively establish any number of traffic routes.

It is further proposed to provide such an arrangement of trackway apparatus and circuits responsive to whistle signals which is normally inactive but is rendered active by a train approaching the routes to be selected.

Other objects, purposes and characteristic features of the present invention will be obvious as the description thereof progresses, during which reference will be made to the accompanying drawings, in which:—

Fig. 1 shows in a simplified and diagrammatic manner an arrangement of trackway apparatus and circuits permitting either of two traffic routes to be selectively established from the cab of an approaching train, which constitutes one specific embodiment of the present invention.

Fig. 2 shows also in a diagrammatic and conventional manner one modification which may be made in the system shown in Fig. 1 to permit a larger number of routes to be selectively established from the cab of an approaching train.

In the embodiment of the present invention shown in Fig. 1, a stretch of railway track is illustrated as comprising blocks or insulated track sections A, B, C, D, E and F, the section D including a track switch TS for routing trains either into section E of the main track or into section F of the diverging track. The track switch TS is power operated by a switch machine SM which is herein shown as controlled by a route relay RR. A switch repeating relay WP is indicated as repeating the operated position of the track switch TS and this relay WP may be controlled in the usual manner to operate its polar and neutral contacts into positions distinctive of the normal and the reverse locked position of the track switch TS, or for example, relay WP may be controlled as shown in detail in Patent No. 1,517,236 granted to C. S. Bushnell, November 25, 1924.

Suitable wayside signals are to be employed in the present system, which have been shown diagrammatically and may be of any well known type such as color light, semaphore or the searchlight type. The signals governing movements over the track switch TS normally display a restrictive indication, the high-arm signal DES governing east-bound movements through section D into section E with the track switch TS in its normal position, while the low arm signal DFS governs movements through section D into section F with the track switch TS in its reverse position. Likewise, a west-bound signal DNS governs movements through section D with the track switch TS in its normal position, while a west-bound signal DRS governs movements through section D with the track switch TS in its reverse position.

A signal repeating relay M is provided which, as indicated by the dotted lines, is energized only when all the signals DES, DFS, DNS and DRS are displaying a stop indication, and inasmuch as the method of controlling such an M relay is well known in the signalling art, the detailed energizing circuit has been omitted. Each of the track sections is provided with a track relay T (having a prefix corresponding to the associated section), which track relay is of the usual normally energized type and the detail energizing circuits have been omitted. A track repeating relay TP is also provided which is energized through front contacts of relays BT and CT in series, whereby to be deenergized in the usual manner whenever a train occupies either section B or section C.

In the present system, the routes over the track switch are to be selected for east-bound train movements in accordance with whistle signals given by an east-bound train while occupying section A, and these whistle signals are received by a microphone CM suitably located along the trackway at a point in section A which preferably will be conspicuously marked to inform the engineer of its location. The microphone CM is illustrated as the double button carbon type although other types could be employed as well, and comprises a diaphragm 5 which is vibrated in resonance with the whistle signals received from the locomotive to alternately vary the resistance between this diaphragm 5 and the oppositely arranged carbon buttons 6 and 7. Microphone CM may thus be actuated by the coinci-

dental audible whistle on the locomotive, or in some cases it may be desirable to provide a supersonic device on the locomotive for actuating the microphone CM.

The microphone CM is normally deenergized and becomes energized when a train occupies section A, to transmit alternating current energy over a line circuit comprising line wires L^1 and L^2 extending from section A to the track switch location, the alternating current in this line circuit controlling a suitable amplifier AMP through an in-put transformer IT. The amplifier AMP may be of any suitable type, but in this particular embodiment a vacuum tube amplifier is employed in which the filament and plate circuits for the vacuum tubes are normally deenergized and becomes energized, as will later be described, from a suitable source of energy indicated as a battery AB when a train enters section A.

The amplifier AMP in this particular arrangement is so arranged that a normal out-put current results when the secondary of the in-put transformer IT is deenergized, which is sufficient to attract the armature of a relay 1F, but when the secondary of the in-put transformer IT is energized by the alternating current supplied by the microphone CM over line wires L^1 and L^2, the out-put of the amplifier AMP is sufficiently reduced to effect the release of the armature of relay 1F. The amplifier can be of any usual or desired form as, for example, a two-tube amplifier with the output of the first tube connected to the grid of the second tube so as to make the grid voltage of the second tube less positive with respect to its filament when the secondary of transformer IT is energized; or it can be comprised of a single tube with the input alternating current rectified and connected to the grid so as to decrease the normal positive grid bias enough to cause relay 1F to release, as described, when alternating current is applied to transformer IT. The amplifier AMP may also include a suitable tuning or filtering arrangement whereby its out-put will be materially reduced only when alternating current of one frequency corresponding to the tune of the particular locomotive whistle is received, thereby preventing unwarranted operation from other sounds such as train noises or the like.

When section A is unoccupied by a train, track relay AT is accordingly energized and a local source of energy, indicated as battery LB, is connected across the line wires L^1 and L^2 to energize an approach control relay V over a circuit from the right-hand terminal of battery LB, front contact 10 of relay AT, line wire L^1, winding of relay V, and back to the left-hand terminal of battery LB over line wire L^2. In the above circuit, it will be noticed that a condenser 12 is provided between the relay V and the primary of transformer IT, whereby the direct current flowing in the line circuit is prevented from flowing through the primary of transformer IT but is permitted to flow through relay V. The energization of relay V disconnects the filament and plate circuits of the amplifier AMP from the battery AB at its open back contact 13, whereby this amplifier is normally deenergized.

When a train enters section A, track relay AT is accordingly dropped, and battery LB is disconnected from line wire L^1 at front contact 10 and is connected to the microphone CM over a circuit from the right-hand terminal of battery LB, back contact 10 of track relay AT, front contact 15 of track relay BT, through a retarder coil 16 to the diaphragm 5 of the microphone CM, which is connected to opposite extreme ends of the primary of transformer MT through carbon buttons 6 and 7 respectively, and current flows back to the left-hand terminal of battery LB from a center tap on the primary of transformer MT through a second retarder coil 17. The secondary of transformer MT is connected to the primary of transformer IT over a circuit which may be traced from the right-hand side of the secondary of transformer MT, back contact 18 of relay AT, line wire L^1, condenser 12, primary of transformer IT and back to the left-hand side of the secondary of transformer MT over line wire L^2.

The dropping of track relay AT obviously disconnects battery LB from relay V, which then drops to energize the amplifier AMP through its back contact 13, and inasmuch as the in-put control circuit for the amplifier is deenergized, the amplifier out-put soon reaches a normal value to pick up relay 1F. A first stick relay FSA is then picked up over an obvious circuit completed through front contact 20 of relay F, whereupon its stick circuit is also completed through back contact 21 of relay V and its stick contact 22.

In operating the present system, an engineer upon reaching the location of the microphone CM, sounds a long blast with his locomotive whistle if he desires to align the reverse route into section F in the present track layout. The diaphragm 5 of the microphone CM is vibrated in resonance with the whistle tone thus produced to alternately increase and decrease the direct current flowing in the two halves of the primary transformer MT, thereby inducing alternating current in the secondary of a frequency proportional to the tone of the locomotive whistle, which alternating current is transmitted over the above circuit to the amplifier AMP, which as previously described reduces the amplifier out-put sufficiently to drop the armature of relay 1F. This dropping of relay 1F after the first stick relay FSA is energized, now energizes a second stick relay FSB over a circuit including back contact 26 of relay F and front contact 24 of relay FSA, and a stick circuit for relay FSB is completed through back contact 21 of relay V and its stick contact 25.

It was previously stated that the reverse route over track switch TS is to be aligned only by a long blast of the locomotive whistle, and in order to distinguish such a long blast from shorter blasts which may be used for other signalling purposes, a timing device is provided which is herein shown as a thermal relay TR. The actuation element or heating coil 27 of thermal relay TR is energized after relay FSB picks up and as long as the engineer continuously sounds the whistle signal, over a circuit extending from (+), back contact 28 of relay 1F, front contact 29 of relay FSB, heating element 27, back contact 30 of a reverse control relay RC, and back contact 31 of a third stick relay FSC to (−). If the whistle signal continues for a predetermined time; determined by the adjustment of the thermal relay TR, the contacts of the thermal relay close and the reverse control relay RC is energized over a circuit including back contact 28 of relay 1F, front contact 29 of relay FSB, the contacts of the thermal relay TR, and the winding of relay RC. When

relay RC is thus picked up, its stick circuit is completed which includes a normally closed contact 32 of a cancelling push button CP, front contact 33 of track relay DT and its stick contact 34.

The third stick relay FSC is provided in the present arrangement to prevent several short whistle signals from effecting operation of thermal relay TR, this relay FSC being picked up at the end of the first blast of the locomotive whistle over a circuit including front contact 28 of relay F, front contact 35 of relay FSB and its operating winding, the relay FSC being retained in its picked up condition over a stick circuit including back contact 21 of relay V and its stick contact 36. In this manner, the picking up of relay FSC at the end of the first whistle signal opens the energizing circuit for the thermal relay TR at its back contact 31, thereby preventing the cumulative effect of subsequent whistle signals from causing an improper operation of the thermal relay in the event the first blast was not of sufficient duration.

In this manner the engineer of a train, while occupying section A, can pick up the reverse control relay RC by sounding a long blast on the locomotive whistle, and the picking up of relay RC energizes the route relay RR with a reverse direction of current. The relay RR may be energized with either direction of current from a suitable source of energy, such as a battery having a center tap (C), and with relay RC energized, current flows from the center tap (C) from right to left through the operating winding of relay RR, front contact 40 of track relay DT, front contact 41 of relay M, and through front contact 42 of relay RC, to (—). This direction of current through the winding of relay RR closes its neutral front contacts and operates its polar contacts to their left-hand positions, thereby closing a reverse operating circuit for the switch machine SM, which is illustrated diagrammatically as including front contact 48 of relay M, neutral front contact 46 and polar contact 45 of relay RR in its reverse position, and the reverse switch operating wire 47. The switch machine SM then operates to move the track switch TS into its reverse position to route traffic into the diverging section F, and when such operation is completed and the track switch TS is locked, relay WP is energized with a polarity of current causing its polar contacts to assume their left-hand positions.

The signal DFS is now controlled to display a clear indication over a circuit including front contact 50 of track relay FT, neutral front contact 51 and polar contact 52 of relay WP in its left-hand position, front contact 53 of relay RR, front contact 54 of track relay DT and the signal operating circuit indicated diagrammatically by dotted line 55.

An approach signal CS has been shown at the entrance of block C, which signal may be automatically controlled in the usual manner in accordance with traffic conditions and will now operate to a clear position after signal DFS has operated to a clear position as just described.

The clearing of signal DFS deenergizes relay M in the usual manner, thus preventing a change in the energization of the route relay RR by opening this control circuit at front contact 41, but a stick circuit is also completed which maintains this reverse polarity of energization of relay RR, which stick circuit may be traced from the center tap C, through the winding of relay RR, front contact 40 of relay DT, neutral front contact 56 and polar contact 57 of relay RR in its left-hand position, and through contact 58 of the cancelling push button CP to (—). The present train under consideration can now progress through sections A, B, C, D and F, and upon entering section D the stick circuit for relay RR will be opened at front contact 40 of track relay DT, thus deenergizing relay RR and the stick circuit for relay RC will likewise be opened at front contact 33. The relays FSA, FSB and FSC are all deenergized as soon as the train departs from section A due to the picking up of approach control relay V from line battery LB upon the picking up of track relay AT, the picking up of relay V opening the stick circuits for these relays at back contact 21.

When the train enters section B the dropping of track relay BT and the consequent opening of front contact 15 removes energy from the microphone circuit so that the microphone will not respond to any sounds.

The present system must also provide for automatic operation of the switch and signals for other movements over the present track layout, for example a west-bound train desiring to enter the main track from the diverging track must also cause the reverse operation of the track switch TS and the clearing of signal DRS. In the present arrangement, this operation is provided by energizing the route relay RR with a reverse direction of current as previously described when a train enters section F, over a circuit which may be traced from the center tap (C), from right to left through the winding of relay RR, front contact 40 of relay DT, front contact 41 of relay M, back contact 42 of relay RC, front contact 62 of relay TP, front contact 61 of relay ET, and back contact 60 of stick relay FT, to (—). The track switch TS is now operated to its reverse position in the manner previously described and the polar contacts of relay WP accordingly assume their left-hand positions, thereby completing a control circuit for signal DRS which includes front contact 64 of relay TP, front contact 65 of relay DT, front contact 66 of relay RR, neutral front contact 67 and polar contact 68 of relay WP in its left-hand position, and the operating circuit for signal DRS indicated by dotted line 69.

An east-bound train which passes through section A without sounding a long whistle signal, as previously described, enters section B and obviously drops relay TP which applies a normal polarity of energization to route relay RR over a circuit from (+), back contact 62 of relay TP, back contact 42 of relay RC, front contact 41 of relay M, front contact 40 of relay DT, from left to right through the winding of relay RR to the center tap (C). This energization of relay RR operates the polar contacts to their right-hand positions to automatically align an east-bound normal route through the present track layout. In other words, the right-hand positions of the polar contacts of relay RR completes a normal operating circuit for switch machine SM which includes front contact 48 of relay M, neutral front contact 46 and polar contact 45 of relay RR in its right-hand position and the normal switch machine operating circuit indicated by wire 70. The track switch TS is now accordingly operated to its normal position which energizes relay WP with a normal polarity of energy to position its polar contacts to the right, thus clearing signal DES over a circuit including front contact 71 of track relay ET, neutral front contact 72 and polar contact 73 of relay WP in its right-

hand position, front contact 74 of relay RR, front contact 75 of relay DT, and the operating circuit for signal DES indicated by dotted line 76.

In a similar manner a west-bound normal route is automatically set up by a train entering section E to drop track relay ET and energize the route relay RR with a normal direction of current over a circuit from (+), back contact 61 of relay ET, front contact 62 of relay TP, back contact 42 of relay RC, front contact 41 of relay M, front contact 40 of relay DT, through the winding of relay RR to the center tap (C). The signal DNS is now cleared over a circuit including front contact 64 of relay TP, front contact 65 of relay DT, front contact 66 of relay RR, neutral front contact 67 and polar contact 68 of relay WP in its right-hand position, and the operating circuit for signal DNS indicated by dotted line 79.

In aligning the above normal routes over the track switch TS, the route relay RR is maintained energized with a normal polarity after the signals clear to drop relay M, over a stick circuit which may be traced from (+), through polar contact 57 in its right-hand position and neutral front contact 56 of relay RR, front contact 40 of relay DT, through the winding of relay RR to the center tap (C). This stick circuit is opened when the train enters section D at front contact 40 of track relay DT to restore the system to its normal condition.

It is contemplated that it may be desirable under certain conditions to permit a reverse route to be manually cancelled after having been established by the whistle signal as previously described, and consequently a manually operable contactor or push button CP has been provided. This push button may be located along the trackway so that the engineer of an eastbound train, after having established a reverse route by the picking up of the reverse control relay RC, may operate the push button CP to drop relay RC by opening its stick circuit at push button contact 32. The operation of the push button CP also opens the stick circuit for relay RR at contact 58, and the dropping of relay RC then applies a normal polarity of energization to route relay RR, providing the relay TP is deenergized, in the manner previously described to align a normal east-bound route over the track switch TS.

It was also contemplated that it may be desirable to at times manually establish a reverse route over the track switch TS and consequently a manually operable contactor or push button RP has also been provided, which when operated closes its contact 82 to pick up the reverse control relay RC over an obvious circuit. The picking up of relay RC then effects the alignment of a reverse route over the track switch TS in the same manner as when relay RC is energized by a whistle signal in the previous description.

Fig. 2 modification

The modification illustrated in Fig. 2 contemplates the control of a plurality of track switches in response to whistle codes made up of short and long blasts of the train whistle. This modification provides for fifteen separate control codes for aligning fifteen separate routes, together with a sixteenth code which is used for cancelling purposes. It will be obvious from the following description how a lesser or greater number of codes may be provided by providing a smaller or larger number of stepping relays in the stepping relay bank, but for purposes of describing the present invention it is believed that the typical arrangement disclosed will indicate how these code combinations build up in such a way that they are doubled for each additional stepping relay provided.

Relays V^1, 1F^1, RC^1 and DT^1 correspond to relays V, 1F, RC and DT of Fig. 1. Push buttons CP^1 and RP^1 correspond to buttons CP and RP of Fig. 1. The stepping relay bank comprises half-step relay VP and stepping relays 1V to 5V, inclusive, which stepping relay bank counts the number of whistle blasts in the code.

Relay SB is of the slow releasing type and is for the purpose of registering a long whistle blast, this relay being dropped out in response to a long blast but remaining picked up in response to a short blast.

The codes received during the various steps of the stepping relay bank are registered on pilot relays 1P to 4P inclusive, and these codes are executed on the fifth step by way of the pyramid contacts on these pilot relays. Cancelling relay C responds to a cancelling code and is for the purpose of releasing any switch control relay which may have been picked up by another code.

It is believed that this modification will be best understood by describing the reception of a particular code for picking up relay RC^1, which relay controls an associated track switch in the same manner that relay RC of Fig. 1 controls the track switch illustrated in this figure. It will be assumed that relay RC^1 responds to code "long, long, long, short".

When the train enters the section (section A of Fig. 1, for example) the dropping of relay V^1 closes a circuit for picking up relay VP which extends from (+), back contact 121 of relay V^1, back contact 100 of relay 1F^1, back contact 101 of relay 1V and winding of relay VP, to (—). Relay VP closes a first stick circuit for itself at its front contact 102 which is independent of back contact 100 and which includes the previously described circuit.

The dropping of relay V^1 renders the amplifier effective to pick up relay 1F^1, but due to the time required for rendering the heater element of the amplifier effective, relay 1F^1 does not pick up and open its back contact 100 before relay VP has been picked up as previously described.

The picking up of relay 1F^1 closes a second stick circuit for relay VP extending from (+), back contact 121 of relay V^1, front contact 100 of relay 1F^1, front contact 103 and winding of relay VP, to (—). The picking up of relay 1F^1 also closes a circuit for picking up relay 1V which extends from (+), back contact 121 of relay V^1, front contact 120 of relay 1F^1, front contact 104 of relay VP, back contacts 105 and 106 of relays 4V and 2V, and winding of relay 1V, to (—). Relay 1V closes an obvious stick circuit for itself at its front contact 107. It will be mentioned at this time that relays 2V to 5V, inclusive, when picked up as later described, close stick circuits for themselves at their front contact 108 to 111 inclusive, which stick circuits maintain the stepping relays energized until the train leaves the track section and picks up relay V^1.

The picking up of relay 1F^1 also closes a circuit including back contact 121 of relay V^1 and front contact 128 of relay 1F^1, for picking up relay SB.

The first whistle blast is sounded, which causes the dropping of relay 1F^1 (in the manner pointed out in connection with the dropping of relay 1F of Fig. 1) and relay VP is dropped because its first

stick circuit is open at back contact 101 of relay 1V and its second stick circuit is open at front contact 100 of relay 1F¹.

Since this is a long blast of the whistle, relay 1F¹ remains down long enough to drop relay SB, which is effective to close a circuit for picking up relay 1P extending from (+), through back contacts 121, 126 and 112 of relay V¹, 1F¹ and SB respectively, back contacts 114, 115, 116 and 117 of relays 5V, 4V, 3V and 2V respectively, front contact 118 of relay 1V, and winding of relay 1P, to (—). Relay 1P closes an obvious stick circuit for itself at its front contact 119.

At the termination of this first whistle blast, relay 1F¹ is again picked up which effects the picking up of relay 2V over a circuit including front contact 120 of relay 1F¹, back contact 104 of relay VP, back contact 122 of relay 5V, back contact 123 of relay 3V, front contact 124 of relay 1V, and winding of relay 2V, to (—).

The second whistle blast effects the dropping of relay 1F¹, which picks up relay VP over a circuit including back contact 100 of relay 1F¹, back contact 125 of relay 3V and front contact 126 of relay 2V. Relay VP is stuck up in the same manner as previously described.

Since this is also assumed to be a long blast, relay SB will be dropped and a circuit closed for picking up relay 2P, which circuit is the same as described for relay 1P except that it extends through front contact 117 of relay 2V to the winding of relay 2P. Relay 2P closes an obvious stick circuit for itself at its front contact 127.

The termination of the second blast picks up relay 1F¹ which is effective to pick up relay 3V over a circuit including front contact 120 of relay 1F¹, front contact 104 of relay VP, back contact 105 of relay 4V, front contact 106 of relay 2V, and winding of relay 3V, to (—).

The third blast drops relay 1F¹ which is effective to drop relay VP because of open back contact 125 of relay 3V and open front contact 100 of relay 1F¹. Since this is a long blast, relay SB is dropped and relay 3P is picked up over a circuit including front contact 116 of relay 3V. Relay 3P closes an obvious stick circuit for itself at its front contact 129.

The termination of the third blast effects the picking up of relay 1F¹ which picks up relay 4V over a circuit including front contact 120 of relay 1F¹, back contact 104 of relay VP, back contact 122 of relay 5V, front contact 123 of relay 3V and winding of relay 4V, to (—).

Although not previously mentioned, it will be understood that relay SB is picked up (when dropped) at the termination of each whistle blast by means of a circuit closed at front contact 128 of relay 1F¹.

The sounding of the fourth blast drops relay 1F¹ which closes a circuit at back contact 100, by way of back contact 130 of relay 5V and front contact 131 of relay 4V for picking up relay VP. Relay VP is stuck up as before.

It is assumed that the fourth blast is a short one, therefore relay 1F¹ will be again picked up in such a short time that the closing of front contact re-energizes relay SB before it has time to drop. Therefore, although the circuit for relay 4P is selected at front contact 115 of relay 4V it is not completed because of open back contact 112 of relay SB.

At the termination of the fourth blast the picking up of relay 1F¹ picks up relay 5V over a circuit including front contact 120 of relay 1F¹, front contact 104 of relay VP, front contact 105 of relay 4V, and winding of relay 5V to (—).

The picking up of relay 5V closes an executing circuit for the selected switch control relay, (which in this event is relay RC¹) and this circuit is completed from (+), back contact 121 of relay V¹, front contact 132 of relay 5V, front contact 135 of relay 1P, front contact 136 of relay 2P, front contact 137 of relay 3P, back contact 138 of relay 4P, winding of relay RC¹, to (—).

Relay RC¹ completes a stick circuit for itself extending from (+), back contact 139 of relay C, contact of button CP¹, front contact 133 of relay DT¹, front contact 134 and winding of relay RC¹ to (—). Contact 142 of relay RC¹ corresponds to contact 42 of relay RC of Fig. 1 and is for the purpose of energizing relay RR with the proper polarity for controlling the reverse operation of track switch TS in response to the above described whistle operated code.

It will be understood that an east bound normal route is automatically set up by a train entering section B, which drops relay TP for closing a circuit through back contact 142 of relay RC¹ to control the normal operation of track switch TS.

When the train leaves section A, relay V1 is picked up and by reason of open back contact 121, the stick circuits for the half-step relay and the stepping relays are deenergized which effects the dropping of these relays. The opening of this contact also deenergizes and drops relay SB and those pilot relays which were picked up.

It is contemplated that it may be desirable under certain conditions to permit a reverse route to be manually cancelled after having been established by the whistle signals as previously described and consequently the operation of push button CP¹ deenergizes the stick circuit of any switch control relay, such as relay RC¹, for restoring contact 142 to its normal position. It is also contemplated that it may be desirable under certain conditions to permit a reverse route to be manually established by operating a push button located along the trackway. Such a push button is illustrated by the reference character RP¹ in Fig. 2, which when operated is effective to pick up relay RC¹ over an obvious circuit, the later relay controlling the reverse operation of the associated track switch.

From the above description and the illustrated additional contacts of relay 4P, it is believed apparent that 15 other codes may be provided by four blasts of the train whistle for controlling 15 other routes.

Relay C effects the cancellation of a previously established route in response to a whistle operated code, by deenergizing the stick circuits for all RC relays at back contact 139. It is assumed that relay C responds to code "long, long, long, long", which code is effective to pick up relays 1P to 4P inclusive for completing the executing circuit by way of the front contacts of all of these relays to the winding of relay C. It is contemplated that an engineer after having set up a first route by code, may for some reason desire to use a different route, and in such case, by cancelling the first route, by sending out the cancellation code, he can leave the first route free for others to use, and also prevent any possibility of the second route not being available to him because of it conflicting with the first route due to local conventional interlocking.

Having thus described a traffic controlling system as one specific embodiment and one modifi-

cation of the present invention, it is to be understood that various modifications, adaptations, and alterations may be applied to meet the requirements of practice without in any manner departing from the spirit or scope of the invention except as limited by the appended claims.

What I claim is:—

1. In combination, a stretch of railway track, a track switch operable to one position or another, a switch control relay, a motor controlled by the operation of said switch control relay for operating said track switch to one position, a sound detector, means located adjacent the trackway and responsive to series of sound waves transmitted from a train in said stretch of track for operating said sound detector, means jointly controlled by the occupancy of said stretch of track by a train and the operation of said sound detector in response only to an uninterrupted and prolonged series of said sound waves for operating said relay, and means responsive to the occupancy of said stretch of track by a train without the transmission of sound waves and the consequent non-operation of said sound detector for causing said motor to operate said track switch to another position.

2. In combination, a stretch of railway track, a track switch, a switch control relay, a cancelling relay, a motor controlled by the operation of said switch control relay for operating said track switch, a sound detector, means located adjacent the trackway and responsive to series of sound waves transmitted from a train in said stretch of track for operating said sound detector, means responsive to an uninterrupted long series of said sound waves for operating said switch control relay, means responsive to a short series of sound waves for operating said cancelling relay, and means responsive to the operation of said cancelling relay for rendering said switch control relay non-responsive to an uninterrupted long series of sound waves.

3. In combination, a stretch of railway track, a track switch, a switch control relay, a cancelling relay, a motor controlled by the operation of said switch control relay for operating said track switch, a sound detector, means located adjacent the trackway and responsive to series of sound waves transmitted from a train in said stretch of track for operating said sound detector, means responsive to an uninterrupted long series of said sound waves for operating said switch control relay, means responsive to a short series of sound waves for operating said cancelling relay, means responsive to the operation of said cancelling relay for rendering said switch control relay non-responsive to an uninterrupted long series of sound waves, means controlled by the departure of said train from said stretch of track for again rendering said switch control relay responsive to an uninterrupted long series of sound waves.

4. In combination, a stretch of railway track, a track switch, a switch control relay, a cancelling relay, a motor controlled by the operation of said switch control relay for operating said track switch, a sound detector, means located adjacent the trackway and responsive to series of sound waves transmitted from a train in said stretch of track for operating said sound detector, means responsive to an uninterrupted long series of said sound wave for operating said switch control relay, means responsive to a short series of sound waves for operating said cancelling relay, means responsive to the operation of said cancelling relay for rendering said switch control relay non-responsive to an uninterrupted long series of sound waves, means controlled by the departure of said train from said stretch of track for again rendering said switch control relay responsive to an uninterrupted long series of sound waves, and additional means for operating said switch control relay.

5. In combination, a stretch of railway track, a track switch, a switch control relay operated by a train whistle, a motor controlled by the operation of said switch control relay for operating said track switch, code responsive means for counting the number and registering the lengths of a plurality of short and long blasts of said whistle making up a code, means controlled by said code responsive means and responsive only to a first code for operating said switch control relay, an energized stick circuit for maintaining said switch control relay operated, and means controlled by said code responsive means and responsive only to a second code for deenergizing said stick circuit whereby said operated switch control relay is released.

6. In combination, a stretch of railway track, a track switch, a switch control relay operated by a train whistle, a motor controlled by the operation of said switch control relay for operating said track switch, code responsive means for counting the number and registering the lengths of a plurality of short and long blasts of said whistle making up a code, means controlled by said code responsive means and responsive only to a first code for operating said switch control relay, an energized stick circuit for maintaining said switch control relay operated, means controlled by said code responsive means and responsive only to a second code for deenergizing said stick circuit whereby said operated switch control relay is released, and track circuit control means for deenergizing said stick circuit.

7. In combination, a stretch of railway track, a track switch, a switch control relay operated by a train whistle, a motor controlled by the operation of said switch control relay for operating said track switch, code responsive means for counting the number and registering the lengths of a plurality of short and long blasts of said whistle making up a code, means controlled by said code responsive means and responsive only to a first code for operating said switch control relay, an energized stick circuit for maintaining said switch control relay operated, means controlled by said code responsive means and responsive only to a second code for deenergizing said stick circuit whereby said operated switch control relay is released, and a manually controlled push button for deenergizing said stick circuit.

8. In combination, a stretch of railway track, a track switch operable to one position or another, a switch control relay, a motor controlled by the operation of said switch control relay for operating said track switch to one position, a sound detector, means located adjacent the trackway and responsive to series of sound waves transmitted from a train in said stretch of track for operating said sound detector, means jointly controlled by the occupancy of said stretch of track by a train and the operation of said sound detector in response to sound waves for operating said relay, and means responsive to the occupancy of said stretch of track by a train without the transmission of sound waves and the consequent non-operation of said sound detector for caus-

ing said motor to operate said track switch to another position.

9. In combination, a stretch of railway track, a track switch operable to one position or another, a switch control relay, a motor controlled by the operation of said switch control relay for operating said track switch to one position, a sound detector, means located adjacent the trackway and responsive to series of sound waves transmitted from a train in said stretch of track for operating said sound detector, means jointly controlled by the occupancy of said stretch of track by a train and the operation of said sound detector in response to prolonged series of said sound waves for operating said relay, and means responsive to the occupancy of said stretch of track by a train without the transmission of sound waves and the consequent non-operation of said sound detector for causing said motor to operate said track switch to another position.

10. In a system of control for power operated track switches from a moving train; a whistle responsive device along the trackway, said device including a control relay picked up for each whistle blast and dropped at the end of each whistle blast; a series of stepping relays governed by said control relay so as to be operated for one step for each whistle blast of series of short and long whistle blasts arranged in a code irrespective of the prolonged lengths of such blasts; code registering means distinctively controlled on each step of said stepping relay bank in accordance with the short or long duration of the whistle blast for that step, whereby any one of a plurality of different codes can be registered during any one series of whistle blasts; and means for controlling a track switch in response to any two of said codes comprising a stick relay having a pick-up circuit closed by the reception of one of said two codes and having a stick circuit opened by the reception of the other of said two codes.

11. In combination, a stretch of railway track including a track switch operable between a normal position and a reverse position, a first approach section connected with said stretch when said switch is occupying its normal position, a second approach section connected with said stretch when said switch is occupying its reverse position, means for causing said switch to assume its normal position or its reverse position according as said first section or said second section respectively becomes occupied by a train, and means whereby one section takes precedence over the other when both sections become occupied simultaneously.

12. In combination, a stretch of railway track including a track switch operable between a normal position and a reverse position, a first approach section connected with said stretch when said switch is occupying its normal position, a second approach section connected with said stretch when said switch is occupying its reverse position, a track circuit, including a track relay, for each of said approach sections, power-operated means for operating the track switch to normal and reverse positions in accordance with the polarity of energy applied to the power-operated means, an energizing circuit for the power-operated means, and a source of energy connected to the circuit with one polarity through a back point of one of the track relays, and with the other polarity through a front point of said one track relay and a back point of the other track relay in series, whereby one section takes precedance over the other when said sections become occupied simultaneously.

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