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TRAIN DISPATCHING SYSTEM FOR RAILROADS

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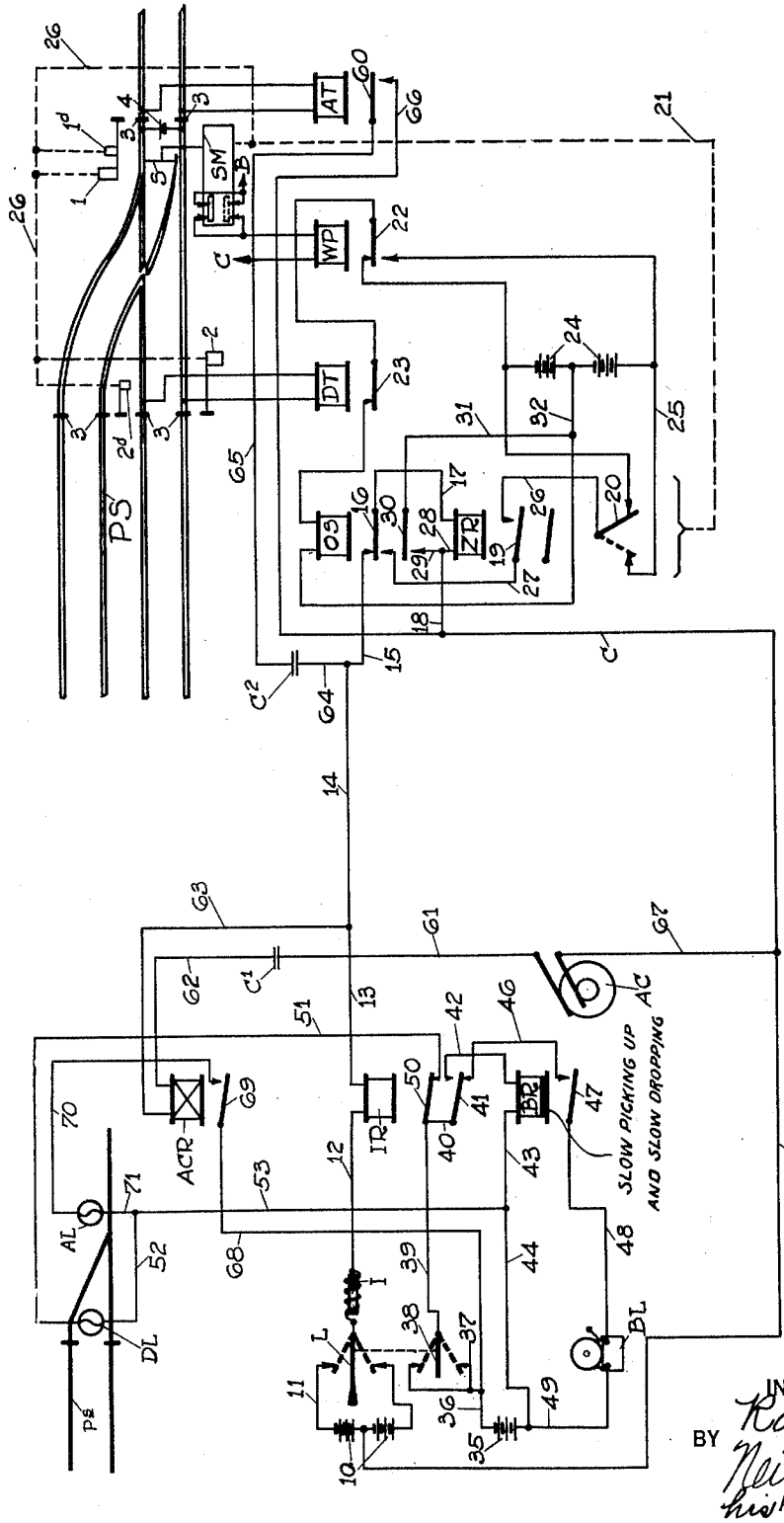

INVENTOR
Ray Plank.
BY Neil H. Preston
his ATTORNEY

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RAY PLANK, OF ROCHESTER, NEW YORK, ASSIGNOR TO GENERAL RAILWAY SIGNAL COMPANY, OF ROCHESTER, NEW YORK

TRAIN DISPATCHING SYSTEM FOR RAILROADS

Application filed September 16, 1929. Serial No. 392,860.

This invention relates to train dispatching systems, and more particularly to means for controlling a distant switch machine and a plurality of signals over the same wire, over which a plurality of conflicting indications are indicated from a distant way station to a local dispatcher's office.

In accordance with the present invention it is proposed to connect a distant way station with a local dispatcher's office through a line wire and common return wire, to control a switch machine and signals associated therewith at such distant way station in accordance with the polarity of direct current or the absence of such current applied to this line circuit at the dispatcher's office, to indicate the occupancy of the detector track circuit at said way station continuously by opening the circuit to the flow of direct current, to indicate the operation of the switch machine by intermittently opening said control circuit to the flow of direct current, and to indicate the occupancy of an approach section by the establishment of a circuit including the same line wire and common return wire over which alternating current but not direct current can flow.

Other objects, purposes and characteristic features of the present invention will in part be understood from the accompanying drawings and will in part be more particularly described hereinafter.

In describing the invention in detail reference will be made to the single accompanying drawing, in which the left-hand portion illustrates the apparatus in the dispatcher's office and the right-hand portion conventionally shows the apparatus at a distant way station.

Referring to the drawing the east end of a passing siding PS of a railway system, having a large number of such passing sidings, has for convenience only been illustrated. This passing siding includes a track switch S, which may be operated by the switch machine SM, this switch S having associated therewith stop-and-stay signals 1, 1^a, 2 and 2^a. The switch S is provided with the usual detector track circuit including the detector track relay DT and the track battery 4, this detector track circuit being divided from the remaining track by insulating joints 3. There is preferably also provided an approach block or track section including the track relay AT. For reasons more clearly pointed out hereinafter the switch machine SM is provided with a switch machine relay WP, which relay is de-energized so long as the switch machine SM assumes an intermediate position, this relay WP being preferably de-energized when the switch machine is unlocked and again energized when the switch machine is locked up.

In the dispatcher's office is provided a miniature track layout corresponding in every detail to the railway system over which the dispatcher has control, and for convenience a portion of the miniature passing siding *ps* only has been shown. In the dispatcher's office and associated with the east end of passing siding *ps* is a lever L for controlling the switch machine and signals at the distant passing siding PS, and similarly there are provided indicating relays IR and ACR for indicating the occupancy of the track circuits containing track relays DT and AT at the distant passing siding PS, a slow-acting bell relay BR being provided for momentarily sounding the bell BL upon occupancy of the detector track circuit at the distant passing siding PS. In order to indicate the occupancy of the approach track section containing the track relay AT, the dispatcher's office equipment includes an alternating current generator AC which is connected in series with a condenser C^1 and the indicating relay ACR. By reason of the impedance of the various direct current relays practically no alternating current will flow in the alternating current relay, and in order to effect energization of this relay ACR an alternating current circuit is established at the distant way station through the medium of another condenser C^2 located at the distant passing siding PS. Obviously direct current cannot flow through the alternating current relay ARC by reason of the condenser C^1. Having now described the principal elements em-

bodying the present invention, it is deemed expedient to take up the operation of the system to illustrate how these elements cooperate to enable a plurality of control functions and indications to be transmitted over the same circuit simultaneously.

Operation.—Attention is directed to the fact that the track switch S assumes its main track position, and that the signals 1, 1^d, 2, and 2^d are all at stop. Let us first assume that the dispatcher wishes to clear a signal. In order to do so he will move the lever L to the upper position, thereby completing the following circuit for the control relay ZR:—beginning at the positive terminal of the battery 10, wire 11, lever contact L, inductive reactance I (which restricts the flow of alternating current through the battery 10) wire 12, indicating relay IR, wire 13, line wire 14, wire 15, front contact 16 of the relay OS, wire 17, winding of the control relay ZR, wire 18, common return wire C, to the midpoint of battery 10. The closure of this circuit will cause the neutral contact 19 of the control relay ZR to pick up, thereby clearing one of the signals 1, 1^d, 2, or 2^d, through circuits conventionally shown by dotted lines 21 and 26, depending upon the sequence of lever movements all in a manner as more clearly described in the prior application of S. N. Wight, Ser. No. 120,423 filed July 3, 1926.

Let us now assume that the dispatcher wishes to operate the switch S to the take-siding position; in order to do so he will operate the lever L to the lower position, thereby first putting all of the signals associated with the switch S in their stop position, this by reason of dropping of the control relay ZR and thereafter will energize the control relay ZR through the circuit just traced with current of reverse polarity, thereby causing the control relay ZR to be energized with its polar contact 20 in its left-hand position.

With the control relay ZR energized to the left the switch machine SM will be operated to its take-siding position through circuits as described in the application to Wight to which reference has been made, which circuits have been conventionally illustrated by the dotted lines 21 and 26. As the switch machine SM is unlocked the relay WP is de-energized, thereby reversing the polarity of current flowing in the relay OS, the circuit of which is readily traced in the drawings and includes the contacts 22 and 23 of the relays WP and DT, respectively, and includes one or the other portion of the battery 24, depending upon whether the contact 22 is in its attracted or retracted position. This dropping of the contact 22 reverses the polarity of current flowing in the relay OS and causes this relay OS to drop momentarily only. This momentary dropping of the relay OS breaks the circuit for the control relay ZR heretofore traced, but completes an auxiliary circuit before the relay ZR drops, this relay ZR being slow dropping, which circuit maintains this control relay ZR energized, and which auxiliary circuit may be traced as follows:—beginning at the negative terminal of the battery 24, wire 25, polar contact 20 of the relay ZR, wire 26, neutral contact 19 of the control relay ZR, wire 27, contact 16 of the relay OS in its retracted position, wire 17, winding of the relay ZR, wires 28 and 29, contact 30 of the relay OS in its retracted position, wires 31 and 32, to the mid-point of battery 24.

Even though the control relay ZR is not de-energized, dropping of the contact 16 of the relay OS opens the line circuit and momentarily de-energizes the indicating relay IR in the dispatcher's office. While the indicating relay IR was energized the following circuit for the bell relay BR was closed:—beginning at the battery 35, wires 36 and 37, contact 38 of the lever L, wires 39, and 40, front contact 41 of the relay IR, wire 42, winding of the relay BR, wires 43 and 44, back to the battery 35. Momentarily de-energization of the indicating relay IR will cause the contact 41 of this relay to momentarily assume its de-energized position, but since the relay BR is slow-acting this relay BR will remain in its energized position, so that the bell BL is momentarily sounded through completion of the following circuit:—beginning at the battery 35, wires 36 and 37, contact 38 of the lever L, wires 39 and 40, contact 41, in its retracted position, wire 46, front contact 47 of the relay BR, wire 48, winding of the bell BL, wire 49 back to the battery 35.

Similarly, the indicating lamp DL is momentarily lighted through completion of the following circuit:—beginning at the battery 35, wires 36 and 37, lever contact 38, wire 39, back contact 50 of the indicating relay IR, wire 51, lamp DL, wires 52, 53, and 44, back to the battery 35. It is thus noted that the indicating lamp DL is momentarily flashed and the audible signal BL is momentarily sounded as the switch machine is initiated upon its operating stroke.

Similarly, as the switch machine SM completes its operating stroke the relay WP is again energized, the relay OS is again de-energized and again energized by current flowing in the opposite direction, so that indicating lamp DL is again flashed and the audible signal BL is again sounded as the switch machine completes its stroke.

Let us now assume that the train passes over the detector track circuit and shunts the track relay DT. As soon as the train treads upon this track circuit the track relay DT is de-energized, thereby opening its contact 23 and effecting dropping of the relay OS, which through the retraction of its contact 16 opens the line circuit and completes an

auxiliary circuit for the control relay ZR, as already explained, in the event the control relay ZR was energized at the time, as has been assumed. With the relay OS now de-energized the line circuit is opened insofar as the flow of direct current is concerned, and the indicating relay IR is similarly de-energized. Obviously, the indicating lamp DL is continuously illuminated so long as the indicating relay IR is in its de-energized position with the lever contact 38 in one of its extreme positions. The audible signal BL is however only sounded for a short time, this because the bell relay BR after a short period of delay opens its contact 47, and stops sounding of the bell BL.

From these considerations it appears that occupancy of the detector track circuit is continuously indicated by the illumination of the indicating lamp DL, and such occupancy is momentarily audibly manifested by sounding of the bell BL. Obviously, as the train moves off of the detector track circuit the track relay DT is again energized effecting energization of the relay OS and reclosure of the line circuit, causing the indicating relay IR to again assume its energized position and effecting extinguishment of the lamp DL. In this connection attention is directed to the fact that the bell BL will not be sounded as the indicating lamp IR again picks up, because the relay BR is slow-picking up and will not close its contact 47 until the contact 41 of the relay IR has been opened.

Attention is directed to the fact that even though the alternating current generator AC is connected directly to the indicating relay ACR, this indicating relay remains in its de-energized position during the various operations heretofore described because alternating current could not flow through the dispatcher's office equipment by reason of the inductive reactance of the relay IR or the reactance I, and such alternating current could not flow through the way station equipment by reason of the inductance of the control relay ZR.

Let us now assume that the train in question treads upon the track circuit containing the track relay AT. As soon as this occurs the track relay AT is de-energized, causing its back contact 60 to close, and thereby completing the following circuit which permits the flow of alternating current only:—beginning at the generator AC, wire 61, condenser C^1, wire 62, winding of the relay ACR, wire 63, line wire 14, wire 64, condenser C^2, wire 65, back contact 60 of the relay AT, wires 66, C, and 67, back to the generator AC. The completion of this circuit effects energization of the indicating relay ACR, thereby completing the following circuit for illuminating the indicating lamp AL:—beginning at the battery 35, wires 36 and 68, front contact 69 of the relay ACR, wire 70, indicating lamp AL, wires 71, 53 and 44, back to the battery 35. It is thus seen that the indicating lamp AL is controlled over the same control circuit over which the control relay ZR is controlled and over which the indicating lamp DL is controlled. Obviously, the relay ACR is again de-energized and the lamp AL is again extinguished as soon as the track relay AT assumes its energized position in response to the departure of the train in question.

Having thus shown and described one rather specific embodiment of the present invention, it is desired to be understood that the particular circuit arrangement selected has been selected to facilitate disclosure of the invention, rather than its scope or the exact construction preferably employed in practicing the same, and that various changes, modifications, and additions may be made to adapt the invention to the particular problem encountered in practicing the same, without departing from the spirit or scope of the invention, or the idea of means underlying the same, except as demanded by the scope of the following claims.

What I claim as new is:—

1. In a train dispatching system, the combination with a distant track switch and a detector track circuit associated therewith, of a switch machine for operating said track switch, a control relay for controlling said switch machine, a local dispatcher's office, a line wire and a return wire connecting said office and said relay, a detector track relay having its front contact connected in series with said control relay, a source of direct current at said dispatcher's office connected across said line and return wire, a lever in series with said source, a direct current indicating relay in series with said lever, an alternating current source having an alternating current relay connected in series therewith connected across said line and return wires, and another track relay which when de-energized allows the flow of alternating current around said control relay but does not allow the flow of direct current, whereby said switch machine may be controlled by said lever, said direct current relay is de-energized upon occupancy of said detector track circuit, and said alternating current relay is energized when said another track relay is de-energized all over the same line circuit.

2. In a train dispatching system, the combination with a distant track switch and a detector track circuit associated therewith, of a switch machine for operating said track switch, a control relay for controlling said switch machine, a local dispatcher's office, a line wire and a return wire connecting said office and said relay, a detector track relay having its front contact connected in series with said control relay, a source of direct current at said dispatcher's office connected across said line and return wire, a lever in

series with said source, a direct current indicating relay in series with said lever, an alternating current source having an alternating current relay connected in series therewith connected across said line and return wire, filter means at said track switch for permitting the flow of alternating current only from said line wire to said return wire, and another track relay which if de-energized renders said filter effective.

3. In a train dispatching system, the combination with a distant track switch and a detector track circuit associated therewith, of a switch machine for operating said track switch, a control relay for controlling said switch machine, a local dispatcher's office, a line wire and a return wire connecting said office and said relay, a detector track relay having its front contact connected in series with said control relay, a source of direct current at said dispatcher's office connected across said line and return wire, a lever in series with said source, a direct current indicating relay in series with said lever, an alternating current source having an alternating current relay connected in series therewith connected across said line and return wires, filter means at said track switch for permitting the flow of alternating current only from said line wire to said return wire, another track relay which if de-energized renders said filter effective, and other means for intermittently opening said line circuit to the flow of direct current when said switch machine is operated, whereby said switch machine may be controlled and three distinctive indications received over the same line circuit.

4. In a train dispatching system, the combination with a distant track switch and a detector track circuit associated therewith, of a switch machine for operating said track switch, a control relay for controlling said switch machine, a local dispatcher's office, a line wire and a return wire connecting said office and said relay, a detector track relay having its front contact connected in series with said control relay, a source of direct current at said dispatcher's office connected across said line and return wire, a lever in series with said source, a direct current indicating relay in series with said lever, an alternating current source having an alternating current relay connected in series therewith connected across said line and return wires, filter means at said track switch for permitting the flow of alternating current only from said line wire to said return wire, another track relay which if de-energized renders said filter effective, other means for opening said line circuit to the flow of direct current intermittently when said switch machine is operated, and means for momentarily sounding an alarm when said direct current relay is de-energized.

5. In a traffic controlling system for railroads, the combination with a distant signal and a local office, a circuit connecting said office and signal location, means for controlling said signal over said circuit in accordance with the direct current voltage manually applied to said circuit at said office, a source of alternating current connected across said circuit at said office, an alternating current responsive device at said office connected in series with said alternating current source, and means at said signal location for controlling the flow of alternating current through said alternating current responsive device without interfering with the flow of said direct current in said circuit.

6. In a traffic controlling system for railroads, the combination with a distant signal and a local office, a circuit connecting said office and signal location, means for controlling said signal over said circuit in accordance with the direct current voltage manually applied to said circuit at said office, a source of alternating current connected across said circuit at said office, an alternating current responsive device at said office connected in series with said alternating current source, means at said signal location for controlling the flow of alternating current through said alternating current responsive device without interfering with the flow of said direct current in said circuits, and indicating means controlled by said alternating current responsive device.

7. In a traffic controlling system for railroads, the combination with a distant signal and a local office, a circuit connecting said office and signal location, means for controlling said signal over said circuit in accordance with the direct current voltage manually applied to said circuit at said office, a source of alternating current connected across said circuit at said office, an alternating current responsive device at said office connected in series with said alternating current source, means at said signal location for controlling the flow of alternating current through said alternating current responsive device without interfering with the flow of said direct current in said circuit, indicating means controlled by said alternating current responsive device, and means at said signal location for controlling the flow of direct current through said circuit without interference with the flow of alternating current through said circuit.

8. In a traffic controlling system for railroads, the combination with a distant signal and a local office, a circuit connecting said office and signal location, means for controlling said signal in accordance with the applied direct current voltage manually applicable to said circuit at said office, a source of alternating current connected across said circuit at said office, an alternating current responsive device at said office connected in series with said alternating current source, means at said

signal location for controlling the flow of alternating current through said alternating current responsive device without interfering with the flow of said direct current, indicating means controlled by said alternating current responsive device, means at said signal location for controlling the flow of direct current through said circuit without interference with the flow of alternating current through said circuit, and other indicating means at said office for indicating the flow of direct current in said circuit.

In testimony whereof I affix my signature.

RAY PLANK.

DISCLAIMER

1,852,368.—*Ray Plank*, Rochester, N. Y. TRAIN DISPATCHING SYSTEM FOR RAILROADS. Patent dated April 5, 1932. Disclaimer filed February 16, 1934, by the assignee, *General Railway Signal Company*.

Hereby enters this disclaimer to claims 5, 6, 7, and 8 of said Letters Patent, which are in the following words, to wit:

"5. In a traffic controlling system for railroads, the combination with a distant signal and a local office, a circuit connecting said office and signal location, means for controlling said signal over said circuit in accordance with the direct current voltage manually applied to said circuit at said office, a source of alternating current connected across said circuit at said office, an alternating current responsive device at said office connected in series with said alternating current source, and means at said signal location for controlling the flow of alternating current through said alternating current responsive device without interfering with the flow of said direct current in said circuit.

"6. In a traffic controlling system for railroads, the combination with a distant signal and a local office, a circuit connecting said office and signal location, means for controlling said signal over said circuit in accordance with the direct current voltage manually applied to said circuit at said office, a source of alternating current connected across said circuit at said office, an alternating current responsive device at said office connected in series with said alternating current source, means at said signal location for controlling the flow of alternating current through said alternating current responsive device without interfering with the flow of said direct current in said circuits, and indicating means controlled by said alternating current responsive device.

"7. In a traffic controlling system for railroads, the combination with a distant signal and a local office, a circuit connecting said office and signal location, means for controlling said signal over said circuit in accordance with the direct current voltage manually applied to said circuit at said office, a source of alternating current connected across said circuit at said office, an alternating current responsive device at said office connected in series with said alternating current source, means at said signal location for controlling the flow of alternating current through said alternating current responsive device without interfering with the flow of said direct current in said circuit, indicating means controlled by said alternating current responsive device, and means at said signal location for controlling the flow of direct current through said circuit without interference with the flow of alternating current through said circuit.

"8. In a traffic controlling system for railroads, the combination with a distant signal and a local office, a circuit connecting said office and signal location, means for controlling said signal in accordance with the applied direct current voltage manually applicable to said circuit at said office, a source of alternating current connected across said circuit at said office, an alternating current responsive device at said office connected in series with said alternating current source, means at said signal location for controlling the flow of alternating current through said alternating current responsive device without interfering with the flow of said direct current, indicating means controlled by said alternating current responsive device, means at said signal location for controlling the flow of direct current through said circuit without interference with the flow of alternating current through said circuit, and other indicating means at said office for indicating the flow of direct current in said circuit."

[*Official Gazette March 13, 1934.*]