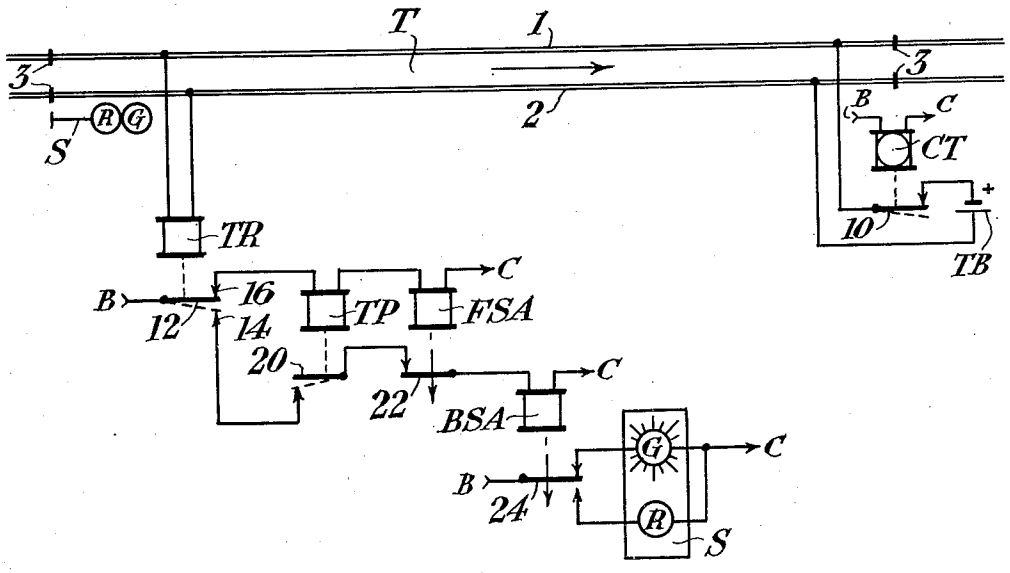
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CODE DETECTING MEANS

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CODE DETECTING MEANS

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My invention relates to coded signaling systems and particularly to improved means for detecting the code following operation of a contact employed in such systems.

In coded signaling systems, code following operation of a track or other relay having a contact recurrently operated between a first and a second position is frequently detected by means of two slow release relays, the first of which is energized when the code following relay contact occupies its first position, and the other of which is energized when the code following relay contact occupies its second position, provided the first slow release relay is picked up. It follows that, when the code following relay contact is operating between its two positions in response to the supply of coded energy to the relay winding, the slow release relays will each be periodically energized. The relays are selected so that their release time is longer than the time interval between the pulses of energy so that as long as the code following relay responds to coded energy the contacts of both of the slow release relays are picked up. If the code following relay contact should remain in its first position for a substantially long time interval, the first slow release relay will remain energized and its contacts will remain picked up. However, the supply of energy to the second slow release relay is interrupted by the contact of the code following relay, and after a short time interval, the second slow release relay will release. If the code following relay contact should remain in its second position for a substantial period of time, the supply of energy to the first slow release relay is interrupted by the contact of the code following relay and after a short time interval the contacts of the first slow release relay will release, thereby interrupting the supply of energy to the second slow release relay, and after a short time interval its contacts will release.

Accordingly, the cessation of operation of the contact of the code following relay results in the release of the second slow release relay. Circuits for the control of various functions may be established over contacts of the second slow release relay.

If for any reason the movable contact of the code following relay should engage both of the associated stationary contacts at the same time, energy will be supplied to both of the two slow release relays, and the circuits controlled over the contacts of the second slow release relay might be improperly established.

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It is an object of my invention to provide improved code detecting means arranged so that defects in the contacts of the code following relay will not result in improper energization of the code detecting means.

Another object of my invention is to provide improved means for detecting the code following operation of a contact which may be subject to misalignment, sticking, etc., that might cause the movable member of the contact to simultaneously engage both of the associated stationary contacts.

Other objects of my invention and features of novelty will be apparent from the following description taken in connection with the accompanying drawing.

In practicing my invention I provide an auxiliary code following relay which is energized in series with the first slow release relay and has a back contact in the circuit for supplying energy to the second slow release relay. If the contacts of the principal code following relay are defective so that the movable contact of the relay simultaneously engages both of the associated stationary contacts, the contact of the auxiliary code following relay will be picked up and will interrupt the circuit of the second slow release relay to thereby insure that it remains released.

I shall describe one form of code detecting means embodying my invention, and shall then point out the novel features thereof in claims.

The accompanying drawing is a diagrammatic view of a section of railway track equipped with signaling apparatus employing code detecting means embodying my invention.

Referring to the drawing, there is shown therein a section of railway track having track rails 1 and 2, which are separated from the rails of the adjacent sections by the insulated rail joints 3. Traffic normally moves through this section from left to right, as indicated by the arrow. A signal S, which as shown is of the color-light type having a green lamp G and a red lamp R, is located at the entrance end of the section, and governs the entrance of traffic into the section.

A conventional type of coded track circuit is shown, including a coding device CT having a contact 10 which is recurrently operated between a first and a second position, and a track battery TB for supplying energy to the track section, the battery and coding device being located at the right-hand or exit end of the section. At the entrance end of the section, there is provided a code following track relay TR, an auxiliary relay TP of the code following type, a

first slow release relay FSA, and a second slow release relay BSA.

In addition, there is provided at each end of the section a source of direct current energy, not shown, whose positive and negative terminals are denoted as B and C, respectively.

With the equipment in its normal condition as shown in the drawing, the coding device CT is continuously connected to terminals B and C of the source, and as a result, its contact 10 is recurrently operated at a selected rate, for instance, 180 times per minute. When the contact 10 of coding device CT moves to its closed position, the track relay TR is supplied with energy by the circuit which is traced from the positive terminal of track battery TB, over front contact 10 of coding device CT, over section rail 1, through the winding of track relay TR, and through section rail 2 to the negative terminal of track battery TB. Accordingly, the movable contact 12 of relay TR is disengaged from stationary back contact 14, and is moved into engagement with stationary front contact 16. After a short time interval, the contact 10 of coding device CT moves to its released position, interrupting the supply of energy to track relay TR over section rails 1 and 2, and as a result, the movable contact 12 of relay TR is disengaged from its stationary front contact 16 and is moved into engagement with its stationary back contact 14.

It will be seen from the foregoing that the supply of impulses of energy to the winding of relay TR causes operation of the contact 12 between its stationary front and back contacts 16 and 14. When the movable contact 12 moves to its picked-up position and engages stationary front contact 16, it establishes the circuit for supplying energy to the relays TP and FSA. This circuit is traced from terminal B over movable contact 12 and front contact 16 of track relay TR, and through the windings of relays TP and FSA in series to terminal C. As a result, these relays are energized and their contacts become picked up.

When the movable contact 12 of track relay TR moves to its released position and engages stationary back contact 14, the circuit previously traced for supplying energy to relays TP and FSA is interrupted. Since relay TP is of the code following type, its contact 20 immediately releases, but since relay FSA is of a type which is slow in releasing its contacts, its contact 22 remains in its picked-up position during the intervals between the supply of impulses of energy to its winding over the circuit previously traced.

Accordingly, on release of relay TR a circuit is established for energizing relay BSA, and is traced from terminal B over movable contact 12 and stationary back contact 14 of relay TR, back contact 20 of relay TP, front contact 22 of relay FSA, and through the winding of relay BSA to terminal C. As a result, contact 24 of relay BSA is picked up and establishes the circuit for supplying energy to the green lamp G of the signal S.

When the movable contact 12 of track relay TR moves out of engagement with its stationary back contact 14, the supply of energy to relay BSA is interrupted. However, relay BSA is slow in releasing its contacts and the relay is selected so that its release time will bridge the intervals between the supply of impulses of energy to its winding, and its contact 24 will remain picked up at this time.

From the foregoing it will be seen that as long as track relay TR is responding to impulses

of energy supplied from the exit end of section T over track rails 1 and 2, the relay BSA will be picked up, and signal S will display a "block clear" indication.

I will now assume that a train enters the section proceeding from left to right. The wheels and axles of the train offer a low resistance path to the energy being supplied to the section rails 1 and 2 from the exit end of section T, and as a consequence, the amount of energy received by track relay TR is insufficient for its operation. As a result, the movable contact 12 of track relay TR engages stationary back contact 14 and remains in that position as long as the train is shunting the winding of track relay TR.

The supply of impulses of energy to relay TP and to relay FSA is thereby interrupted and after a short time interval, the contacts of relay FSA release, interrupting the supply of energy to relay BSA so that it releases.

When contact 24 of relay BSA releases, it interrupts the supply of energy to the green lamp G of signal S, and establishes the circuit for supplying energy to the red lamp R of the signal.

When the train passes out of the section, impulses of coded energy are again supplied to the winding of track relay TR and its contact 12 operates in accordance with the impulses of energy received. The relays TP, FSA and BSA are again supplied with energy, and as a consequence relay FSA picks up and relay BSA thereafter picks up, extinguishing the red lamp R of signal S and lighting the green lamp G. The equipment is thus restored to its normal condition as previously described.

If for any reason contact 12 of relay TR should remain picked up continuously, it will be seen that although the relays TP and FSA are continuously supplied with energy, the supply of energy to relay BSA is interrupted by contact 20 of relay TP, as well as by contacts 12 and 14 of relay TR. Accordingly, the signal S will have its red lamp R lighted.

My invention has a particular advantage in detecting the defects in the contacts of the track relay TR which result in the movable contact 12 of relay TR engaging both the stationary front contact 16 and the stationary back contact 14 continuously. As a result of this condition, energy is continuously supplied to relays TP and FSA and their contacts will remain picked up. Although contacts 12 and 14 of relay TR and the front contact 22 of relay FSA in the circuit for supplying energy to the relay BSA will be closed, the contact 20 of relay TP will be picked up, interrupting the circuit and consequently relay BSA will receive no energy and its contact 24 will be released and will interrupt the circuit of the green lamp G and establish the circuit of the red lamp R of signal S.

It will be seen therefore that defects in the contacts of the relay TR cannot result in the improper display of the green or clear indication by signal S, but can only result in the display of the red or stop indication by this signal.

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

Having thus described my invention, what I claim is:

1. In combination, a principal code following

relay having a contact movable between a first position in which it engages a first stationary contact and a second position in which it engages a second stationary contact, a first slow release relay supplied with energy by a circuit which includes the winding of a code following auxiliary relay and the movable contact of the code following relay in its first position; a second slow release relay supplied with energy by a circuit which includes a front contact of said first slow release relay, a back contact of said auxiliary relay, and said movable contact of said code following relay in its second position; and a circuit controlled by a contact of said second slow release relay.

2. In combination, a principal code following relay having contacts movable between a first and a second position, a first circuit established when said contacts occupy their first position for supplying energy to the windings of a code following auxiliary relay and of a first slow release relay, a second circuit established when the contacts of said code following relay occupy their second position for supplying energy to the winding of a second slow release relay, said second

circuit including a front contact of said first slow release relay and a back contact of said auxiliary relay, and a circuit controlled over said second slow release relay.

3. In combination, a principal code following relay having contacts movable between a first and a second position, a first and a second slow release relay, a code following auxiliary relay having its winding connected in series with the winding of said first slow release relay, a circuit for energizing the windings of said first slow release relay and said auxiliary relay which includes a contact of said code following relay closed in its first position, a circuit for energizing said second slow release relay which includes in series a front contact of said first slow release relay and a back contact of said auxiliary relay, and in addition includes a contact of said code following relay closed in its second position, and a circuit controlled by a contact of said second slow release relay.

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No references cited.