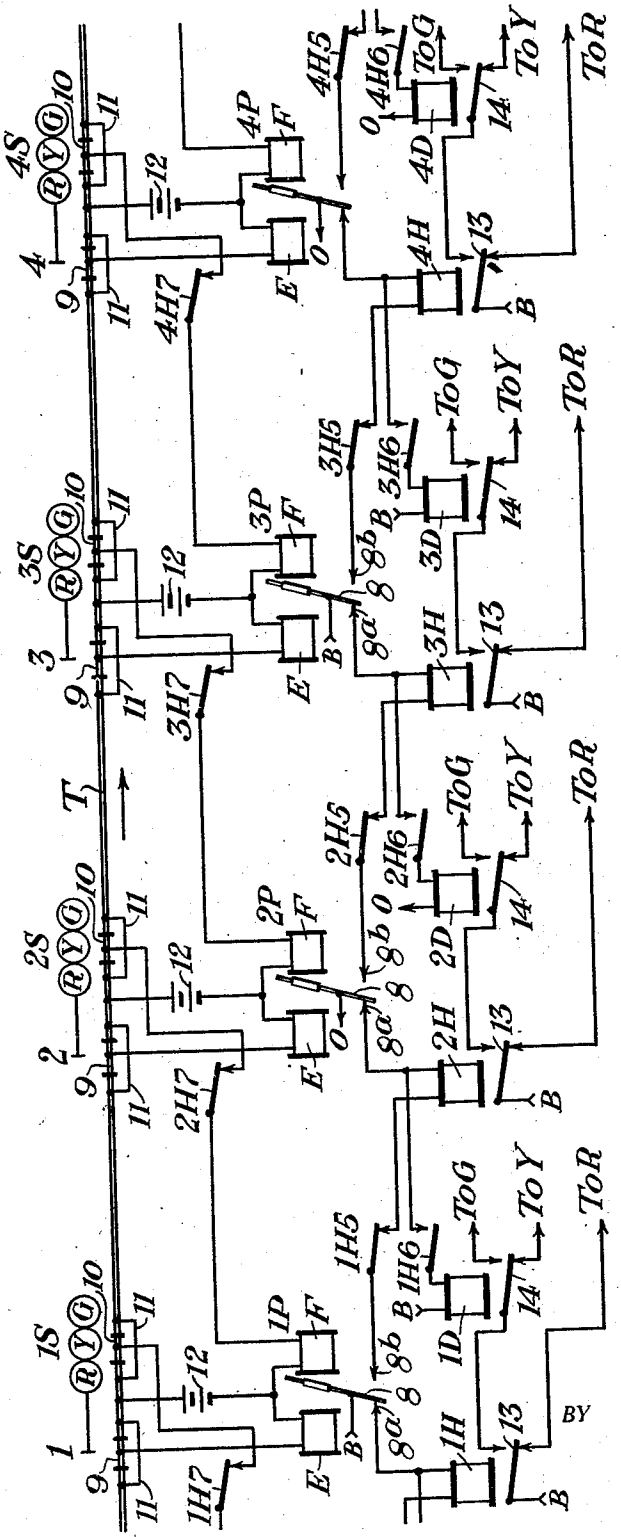
May 24, 1932. P. H. CRAGO 1,859,960

RAILWAY SIGNALING

Filed March 13, 1931



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Patented May 24, 1932

1,859,960

UNITED STATES PATENT OFFICE

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RAILWAY SIGNALING

Application filed March 13, 1931. Serial No. 522,245.

My invention relates to railway signaling, and particularly to automatic signaling systems of the type wherein the signals are controlled by the passage of trains over short insulated track sections. Signaling systems embodying my invention are particularly well adapted for, though not limited to, traction systems of the monorail third rail, or overhead trolley types.

I will describe one form of signaling system embodying my invention, and will then point out the novel features thereof in claims.

The accompanying drawing is a diagrammatic view showing one form of signaling system embodying my invention.

Referring to the drawing, the reference character T designates a track rail of a railway track, and may, for example, be the single rail of a monorail traction system. Traffic along this track normally moves in the direction indicated by the arrow. The track T is divided into a plurality of blocks 1—2, 2—3, 3—4, etc. Located at the entrance end of each block is a short insulated rail section 9, the length of this section being less than the length of the shortest truck or car which uses the railroad. Located in advance of the entrance end of each block is a second insulated rail section 10, which is similar to the section 9, and is preferably located slightly more than the maximum train length in advance of the associated section 9. Each track section 9 and 10 is provided with a jumper 11, which connects the two ends of the rail T on each side of the section.

Each block is provided with a main relay designated by the reference character P with a distinguishing prefix, each of which relays comprises a reverse winding E, a normal winding F, and a contact member 8 which is moved to a normal or a reverse position in response to energization of the normal or reverse winding. The relay is so designed that the contact member 8 will remain in the position to which it is moved by either winding until the other winding becomes energized. Referring to relay 1P, the reverse winding E is provided with a circuit which includes the associated insulated rail section 9, the main rail T, and a battery 12. The normal winding F of this relay is provided with a circuit which includes the insulated rail section 10 for the block next in advance, as well as battery 12 and the track rail T. It follows that both windings of relay 1P are normally deenergized, and that winding E will become momentarily energized when a train wheel occupies the associated track section 9, whereas winding F will become momentarily energized when a train wheel occupies track section 10 for block 2—3. A relay contact 2H7 is included in the circuit for winding F, and the reason for this contact will be explained hereinafter.

Each block is provided with a home relay H and a distant relay D, the reference characters for these relays being provided with distinguishing prefixes. Referring to relay 2H for block 2—3, the circuit for this relay is from terminal B of a suitable source of current, through reverse contact 8—8^b of relay 1P, back contact 1H5 of home relay 1H, winding of relay 2H and normal contact 8—8^a of relay 2P to terminal O of the same source of current. It will be seen that this circuit is closed when and only when relay 1P is in the reverse position and relay 2P is in the normal position. The circuit for distant relay 1D is from terminal B, through the winding of relay 1D, front contact 1H6 of home relay 1H, and normal contact 8—8^a of relay 2P. It follows that relay 1D will be energized when and only when relay 1H is energized and relay 2P is in the normal position.

Located adjacent the entrance of each block is a signal designated by the reference character S with a distinguishing prefix. Each of these signals, in the form here shown, comprises three electric lamps G, Y and R, arranged when lighted to indicate proceed, caution and stop, respectively. These lamps are controlled by the contacts 13 and 14 of the home and distant relays in the usual and well known manner. That is to say, when both relays H and D are energized, the proceed lamp of the associated signal will be lighted; when relay H is energized and relay D is deenergized, the caution lamp Y of the associated signal will be lighted; and when relay H

is deenergized, the stop lamp R of the associated signal will be lighted.

The operation of the apparatus is as follows: Normally, all of the P relays are in their normal positions, and all H and D relays are deenergized, so that all signals S indicate stop. When the first wheel of a train enters section 9 at point 1, it will momentarily energize the reverse winding E of relay 1P, thereby causing contact member 8 of this relay to swing in counter-clockwise direction and so to close the reverse contact 8—8^b. The circuit for relay 2H will then become closed, and this in turn will close contact 2H6, thereby completing the circuit for relay 2D. It follows that with blocks 1—2, 2—3 and 3—4 unoccupied, relays 2H and 2D will both become energized, so that signal 2S will indicate proceed. When the train passes section 10 of block 1—2, it will have no effect on those portions of the apparatus shown in the drawing. When the train enters section 9 at location 2, it will reverse relay 2P, thereby opening at contact 8—8^a, the circuit for relay 2H, with the result that signal 2S will change from the proceed indication to the stop indication. When the first wheel of the train enters section 10 in block 2—3, it will momentarily energize the normal winding F of relay 1P, thereby restoring the latter relay to its normal position. It will be noted that the circuit for winding F of relay 1P includes back contact 2H7, so that this winding F can not be energized to restore relay 1P to its normal position unless relay 2H has become deenergized in response to the reversal of relay 2P. The operation of the apparatus during the progress of the train through the remainder of the stretch of track shown in the drawing, will be apparent from the foregoing without further detailed explanation.

It will be noted that the circuit for each home relay H includes a back contact 5 of the home relay for the preceding block. This contact serves as a further check on the proper operation of the apparatus, for the reason that relay 3H, for example, can not become energized when a train enters block 2—3 unless relay 2H opens in response to the passage of this train over rail section 9 at location 2.

Although I have herein shown and described only one form of signaling system 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 railway track divided into blocks, a main relay for each block having a normal and a reverse winding and a contact member which is moved to normal or reverse position in response to momentary energization of the normal or the reverse winding and which subsequently remains in the position to which it is moved by either winding until the other winding becomes energized, means operating when a train enters a block to energize the reverse winding of the associated main relay, means operating when a train has proceeded a given distance into a block to energize the normal winding of the main relay for the block next in the rear, a home relay and a distant relay for each block, means for energizing the home relay for a block when and only when the associated main relay is in normal position and the main relay for the block next in the rear is in the reverse position, means for energizing the distant relay for a block when and only when the associated home relay is energized and the main relay for the block next in advance is in normal position, and signals for the blocks controlled by said home and distant relays.

2. In combination, a railway tack rail divided into blocks, a short insulated rail section at the entrance to each block and a second short insulated rail section for each block at substantially maximum train length in advance of the first insulated section, a conductor connecting the two ends of said rail on each side of each insulated section, a main relay for each block having a normal and a reverse winding and a contact member which is moved to normal or reverse position in response to energization of the normal or reverse winding and which subsequently remains in the position to which it is moved by either winding until the other winding becomes energized, a circuit for the reverse winding of each main relay including the first insulated rail section for the associated block and the main rail as well as a source of current, a circuit for the normal winding of each main relay including the second insulated rail section for the block next in advance and the main rail as well as a source of current, and signals for the blocks controlled by said relays.

3. In combination, a railway track rail divided into blocks, a short insulated rail section at the entrance to each block and a second short insulated rail section for each block at substantially maximum train length in advance of the first insulated section, a conductor connecting the two ends of said rail on each side of each insulated section, a main relay for each block having a normal and a reverse winding and a contact member which is moved to normal or reverse position in response to the energization of the normal or reverse winding and which subsequently remains in the position to which it is moved by either winding until the other winding becomes energized, a circuit for the reverse

winding of each main relay including the first insulated rail section for the associated block and the main rail as well as a source of current, a circuit for the normal winding of each main relay including the second insulated rail section for the block next in advance and the main rail as well as a source of current, a home relay and a distant relay for each block, means for energizing the home relay for a block when and only when the associated main relay is in normal position and the main relay for the block next in the rear is in the reverse position, means for energizing the distant relay for a block when and only when the associated home relay is energized and the main relay for the block next in advance is in normal position, and signals for the blocks controlled by said home and distant relays.

4. In combination, a railway track divided into blocks, a main relay for each block having a normal and a reverse winding and a contact member which is moved to normal or reverse position in response to momentary energization of the normal or the reverse winding and which subsequently remains in the position to which it is moved by either winding until the other winding becomes energized, means operating when a train enters a block to energize the reverse winding of the associated main relay, means operating when a train has proceeded a given distance into a block to energize the normal winding of the main relay for the block next in the rear, a home relay and a distant relay for each block, a circuit for each home relay including a normal contact of the associated main relay and a reverse contact of the main relay for the block next in the rear as well as a back contact of the home relay for such block next in the rear, a circuit for each distant relay including a front contact of the associated home relay and a normal contact of the main relay for the block next in advance, and signals for the blocks controlled by said home and distant relays.

In testimony whereof I affix my signature.

PAUL H. CRAGO.