

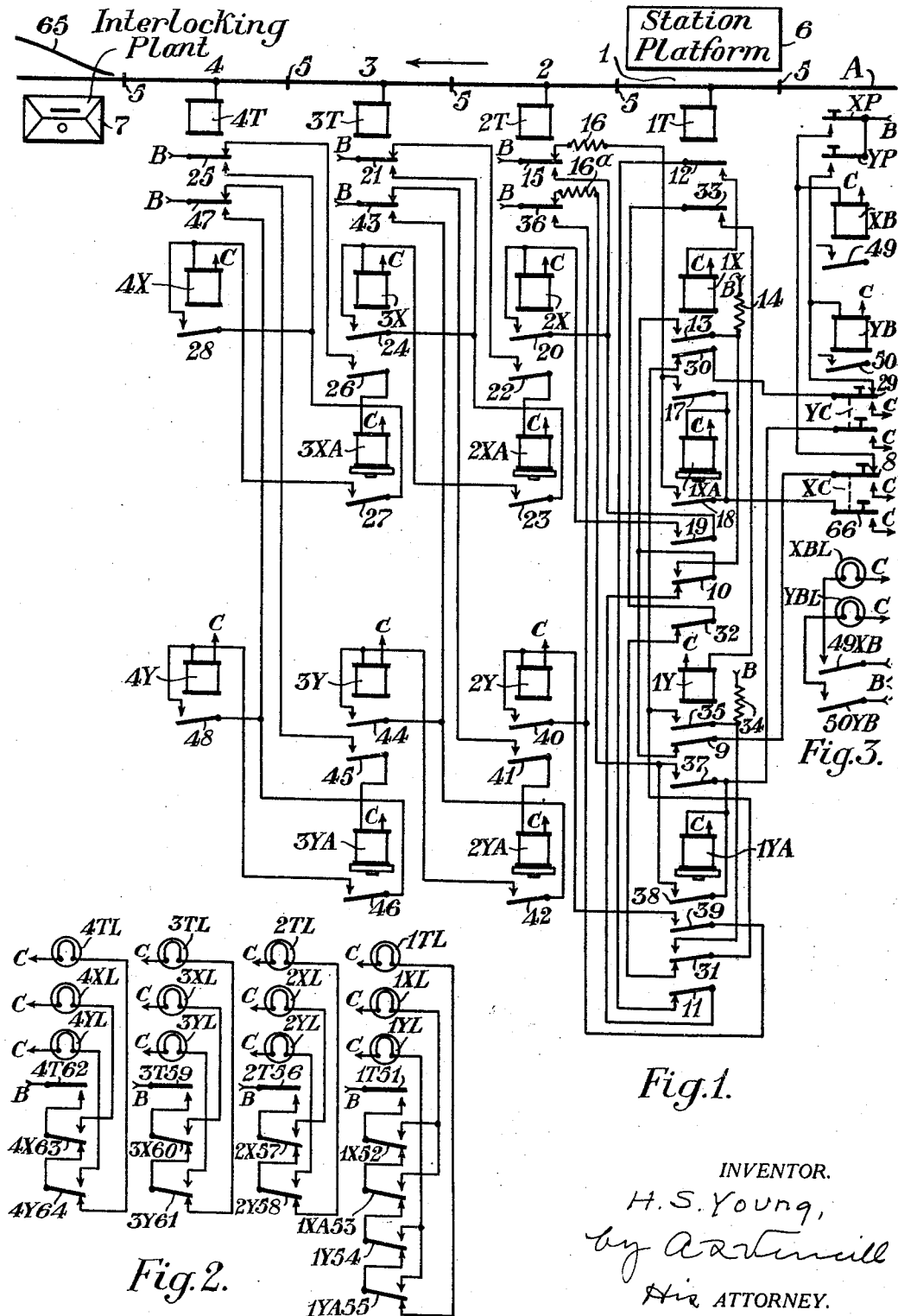
Nov. 10, 1931.

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1,830,820

RAILWAY TRAIN ROUTE INDICATING APPARATUS

Filed June 9, 1931



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RAILWAY TRAIN ROUTE INDICATING APPARATUS

Application filed June 9, 1931. Serial No. 543,037.

My invention relates to railway train route indicating apparatus, and has for an object the provision of novel and improved means for indicating to the operator of an interlocking plant or of a despatcher's controlling equipment, the route which is to be taken by an approaching train, as well as the progress of such train while it approaches the tower.

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

In the accompanying drawings, Fig. 1 is a diagrammatic view showing one form of trackway apparatus embodying my invention. Fig. 2 is a diagrammatic view showing the tower indicating apparatus which is controlled by the trackway apparatus shown in Fig. 1. Fig. 3 is a diagrammatic view showing local indicating apparatus controlled by relays XB and YB.

Similar reference characters refer to similar parts in all three of the views.

Referring first to Fig. 1, the reference character A designates a railway track along which traffic normally moves in the direction indicated by the arrow. This track is divided by the usual insulated joints into four sections, 1, 2, 3 and 4. A station platform 6 may be located in section 1, whereas an interlocking tower 7 may be located at the exit end of section 4. The interlocking plant associated with this tower includes a switch 65 by virtue of which trains passing through the plant may be allowed to continue on the main track or may be diverted into another route.

Each track section is provided with a track circuit comprising the usual track relay designated by the reference character T with a prefix corresponding to the section. Associated with the section 1 are two main relays 1X and 1Y, as well as two auxiliary relays 1XA and 1YA. Sections 2 and 3 are provided with similar relays, but section 4 need have only the two main relays 4X and 4Y. Two normally open push buttons XP and YP are associated with section 1 and are preferably so located that they may be operated by the motorman of a train standing at station platform 6. Associated with these push buttons are two indicator relays XB and YB, as well as two cancelling push buttons XC and YC, which may also be conveniently reached by the motorman of the train standing at the platform.

Located in the interlocking tower 7 are three banks of indicating lamps TL, XL and YL, (Fig. 2), which lamps are controlled by the track relays T, the main relays X and Y, and the auxiliary relays XA and YA, as hereinafter explained.

I will first assume that a train is standing at the station platform 6, and that this train is to continue through the interlocking plant 7 on the main track A. The motorman of this train will momentarily close push button XP, thereby closing a pick-up circuit for relay 1X. This circuit is from terminal B of a suitable source of current, through push button XP, back contact 8 of cancelling push button XC, back contact 9 of relay 1Y, back contact 10 of relay 1XA, back contact 11 of relay 1YA, back contact 12 of track relay 1T, and the winding of relay 1X to terminal C of the same source of current. When relay 1X closes, a stick relay for this circuit will become closed, which circuit is from terminal B, through a resistor 14, front contact 13 of relay 1X, back contact 10 of relay 1XA, back contact 11 of relay 1YA, back contact 12 of track relay 1T, and the winding of relay 1X to terminal C. It follows that relay 1X will remain closed after the motorman releases push button XP. If section 2 is unoccupied, so that track relay 2T is closed, a pick-up circuit for relay 1XA will be closed, this circuit being from terminal B, through front contact 15 of relay 2T, resistor 16, front contact 17 of relay 1X, and the winding of relay 1XA to terminal C. When relay 1XA closes, it will close a stick circuit for itself, which circuit is from terminal B, through front contact 15 of track relay 2T, resistor 16, front contact 18 of relay 1XA, and the winding of this relay to terminal C. The closing of relay 1XA will open at back contact 10 the stick circuit for relay 1X, so that the latter relay will then open.

Referring now to Fig. 2, the moment the train enters track section 1, and thereby opens

track relay 1T, lamp 1TL will become lighted, the circuit for this lamp being from terminal B, through back contact 51 of relay 1T, back contact 52, 53, 54 and 55 of the other relays associated with section 1 and the lamp 1TL to terminal C. When relay 1X closes, in response to the operation of push button XP, the circuit for lamp 1TL will be opened at contact 52 of relay 1X, and lamp 1XL will become lighted by virtue of a circuit which passes from terminal B, through back contact 51 of relay 1T, front contact 52 of relay 1X and lamp 1XL to terminal C. When relay 1XA subsequently becomes closed and relay 1X opens, lamp 1XL will remain lighted because of the new circuit which includes back contact 51 of relay 1T, back contact 52 of relay 1X, and front contact 53 of relay 1XA. The lighting of lamp 1XL indicates to the operator of the interlocking tower 7 that the approaching train which is in section 1 is to continue on the main track A.

When the front end of this train enters section 2, it will open track relay 2T, thereby opening the stick circuit for relay 1XA at contact 15. At the same time a pick-up circuit for relay 2X will be closed, which circuit is from terminal B, through back contact 15 of track relay 2T, front contact 19 of relay 1XA, and the winding of relay 2X to terminal C. Relay 1XA is slow-releasing in character, thereby providing ample time for relay 2X to close after the stick circuit for relay 1XA is opened at front contact 15. When relay 2X closes, it will close a stick circuit for itself, which circuit includes back contact 15 of track relay 2T and front contact 20 of relay 2X. Referring again to Fig. 2, the opening of relay 1XA will extinguish lamp 1XL, and the closing of relay 2X will cause lamp 2XL to become lighted, the circuit for this lamp including back contact 56 of track relay 2T and front contact 57 of relay 2X.

With relay 2X closed, and assuming that section 3 is unoccupied, relay 2XA will become energized by virtue of a circuit which includes front contact 21 of track relay 3T and front contact 22 of relay 2X. Lamp 1TL in the interlocking tower indicator will become lighted after relay 1XA releases, but this lamp will become extinguished as soon as the rear end of the train passes out of section 1.

When the front end of the train enters section 3, it will open track relay 3T, thereby closing a pick-up circuit for relay 3X, which circuit includes back contact 21 of relay 3T and front contact 23 of relay 2XA. The opening of front contact 21 of relay 3T will open the circuit for relay 2XA, so that this relay will release after a sufficient interval of time has elapsed to allow relay 3X to close. Relay 2X will remain closed, however, until the rear end of the train passes out of section 2. It follows that while the train is

bridging sections 2 and 3, indicator lamps 2XL and 3XL will both be lighted, whereas when the rear end of the train passes out of the section 2, lamp 2XL will be extinguished.

After relay 3X closes, it will close a stick circuit for itself, which includes back contact 21 of relay 3T and front contact 24 of relay 3X. It follows that this relay will remain closed after relay 2XA releases.

With the train occupying section 3, and assuming that section 4 is unoccupied, relay 3XA will close by virtue of a circuit which includes front contact 25 of relay 4T and front contact 26 of relay 3X. Then when the train enters section 4, it will open track relay 4T, thereby closing a pick-up circuit for relay 4X, which circuit includes back contact 25 of relay 4T and front contact 27 of relay 3XA. As soon as relay 4X closes, it will close a stick circuit for itself, which circuit includes back contact 25 of track relay 4T and front contact 28 of relay 4X, so that the latter relay will remain closed after relay 3XA releases due to the opening of front contact 25 of relay 4T. When the rear end of the train passes out of section 3, relay 3X will release, because its stick circuit will be open at back contact 21 of relay 3T.

While the train is bridging sections 3 and 4, lamps 3XL and 4XL will be lighted, but lamp 3XL will become extinguished as soon as the rear end of the train leaves section 3. When the train leaves section 4, relay 4X will release, thereby extinguishing lamp 4XL.

I will now assume that a train is standing at a station platform, and that the motor-man operates push button YP. This will close a pick-up circuit for relay 1Y, which circuit passes from terminal B, through push button YP, back contact 29 of push button YC, back contact 30 of relay 1X, back contact 31 of relay 1YA, back contact 32 of relay 1XA, back contact 33 of track relay 1T, and the winding of relay 1Y to terminal C. It follows that relay 1Y cannot be closed, unless all four relays 1T, 1X, 1XA and 1YA are open. When relay 1Y becomes closed, it will close a stick circuit for itself which excludes push button YP, this stick circuit being from terminal B, through resistor 34, front contact 35 of relay 1Y, back contact 31 of relay 1YA, back contact 32 of relay 1XA, back contact 53 of relay 1T, and the winding of relay 1Y to terminal C. With relay 1Y closed and track section 2 unoccupied, a pick-up circuit for relay 1YA will be closed, which circuit is from terminal B, through front contact 36 of track relay 2T, resistor 16^a, contact 37 of relay 1Y, and the winding of relay 1YA to terminal C. Relay 1YA will then remain closed as long as track relay 2T is closed, because of a stick circuit which includes front contact 36 of relay 2T and front contact 38 of relay 1YA.

With either relay 1Y or 1YA closed, indi-

erator lamp 1YL will be lighted by virtue of a circuit which will be obvious from the drawings and from the foregoing description. The lighting of this lamp will indicate to the operator at the interlocking plant that the train which is occupying section 1 is to be diverted from track A by the switch 65.

Assuming that this train passes through sections 2, 3 and 4, the Y relays associated with these sections will be operated in a manner which corresponds exactly to the operation of the X relays, explained hereinbefore, and, consequently, a detailed tracing of the circuits for the Y relays will be unnecessary. It is sufficient to say that as the train passes through sections 2, 3 and 4, indicator lamps 2YL, 3YL and 4YL will be successively lighted.

I will now assume that the motorman of a first train has operated push button XP, and that the train has passed into section 2, and that the motorman of a second train occupying section 1 operates push button YP. Relay 1Y will become energized by virtue of the circuit traced hereinbefore, but relay 1YA will not become energized, because its circuit will be opened at the front point of contact 36 of track relay 2T. This brings out the reason for the auxiliary relays 1XA, 1YA, etc. If relay 2Y were controlled directly by relay 1Y instead of by relay 1YA, then under the condition which has just been assumed, relay 2Y would close, due to the fact that the track relay 2T is opened, and, consequently, would give a false indication in the interlocking tower, because both lamps 2XL and 2YL would be lighted. By providing relay 1YA, however, the apparatus is so arranged that under the assumed condition, lamp 2XL will be lighted to indicate that the main line train is in section 2, and lamp 1YL will be lighted to indicate that the branch line train is in section 1.

The operation of the apparatus during the continued progress of these two trains through sections 2, 3 and 4 will be understood without detailed explanation.

It will be noted that if a train leaves the station platform 6 without either push button XP or YP having been operated, lamps 1TL, 2TL, 3TL and 4TL will be successively lighted as the train passes through sections 1, 2, 3 and 4, thereby indicating to the operator of the interlocking plant either that the motorman has failed to operate one of the push buttons, or that the main and auxiliary relays have failed to operate in response to the closing of a push button.

As soon as push button XP is closed, an indicator relay XB will become closed by virtue of a circuit which will be obvious from the drawings. Contact 49 of this relay will light an indicator lamp XBL (see Fig. 3) which is preferably located in such a position that it can be seen by the motorman of

the train standing at the station platform.

After push button XP is released, relay XB will remain closed, provided that relay 1X closes, the circuit being from terminal B, through resistor 14, front contact 13 of relay 1X, back contact 9 of relay 1Y, cancelling push button contact 8, and the winding of relay XB to terminal C. After relay 1XA closes and relay 1X opens, relay XB will still remain closed by a circuit which passes from terminal B, through resistor 14, front contact 10 of relay 1XA, back contact 9 of relay 1Y, push button contact 8 and the winding of relay XB to terminal C. It follows that relay XB will remain energized until relay 1XA opens, and so it follows that lamp XBL will remain lighted until it is proper for either push button to be operated to transmit a new indication to the interlocking tower. Push button Y and the relays associated therewith control an indicator relay YB in a similar manner, and contact 50 of this relay controls an indicator lamp YBL.

If the motorman operates push button XP when he should have operated push button YP, and if he discovers the error before leaving the station platform, he may deenergize relay 1X by operating the cancelling push button XC, thereby connecting both terminals of relay 1X with terminal C through contact 8. If relay 1XA has closed before the error is discovered, the operation of push button XC will place this relay on short circuit by connecting both of its terminals with terminal C, through contact 66 of push button XC. Similarly, push button YC may be utilized to cancel an improper operation of push button YP, the operation of this cancelling push button being obvious from the foregoing explanation of the operation of push button XC.

Although I have herein shown and described only one form of apparatus 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 stretch of railway track divided into a plurality of successive sections, a track relay for each section, a main X relay and a main Y relay for each section, an auxiliary X relay and an auxiliary Y relay for each section, two normally open push buttons XP and YP associated with the first section and corresponding to said X and Y relays respectively, means for closing either main relay for the first section when the associated track relay is open and the associated push button is closed provided the other relays for such section are open, and for subsequently keeping such main relay closed as long as such track relay and both

auxiliary relays for the section remain open; means for closing either auxiliary relay for the first section when the associated main relay and the track relay for the second section are closed and for keeping it closed until such track relay opens; means for closing either main relay for each succeeding section when the associated track relay is open and the corresponding auxiliary relay for the section next in the rear is closed, and for keeping it closed until such track relay closes; means for closing either auxiliary relay for each of said succeeding sections when the associated main relay and the track relay for the section next in advance are closed; and indicating means controlled by said main and auxiliary relays.

2. In combination, a stretch of railway track divided into a plurality of successive sections, a track relay for each section, a main X relay and a main Y relay for each section, an auxiliary X relay and an auxiliary Y relay for each section, two normally open push buttons XP and YP associated with the first section and corresponding to said X and Y relays respectively, means for closing either main relay for the first section when the associated track relay is open and the associated push button is closed provided the other relays for such section are open, and for subsequently keeping such main relay closed as long as such track relay and both auxiliary relays for the section remain open; means for closing either auxiliary relay for the first section when the associated main relay and the track relay for the second section are closed and for keeping it closed until such track relay opens; means for closing either main relay for each succeeding section when the associated track relay is open and the corresponding auxiliary relay for the section next in the rear is closed, and for keeping it closed until such track relay closes; means for closing either auxiliary relay for each of said succeeding sections when the associated main relay and the track relay for the section next in advance are closed; an X and a Y indicating lamp for each section, and means for lighting either lamp for each section when the associated track relay is open and the corresponding main relay is closed.

3. In combination, a stretch of railway track divided into a plurality of successive sections, a track relay for each section, a main X relay and a main Y relay for each section, an auxiliary X relay and an auxiliary Y relay for each section, two normally open push buttons XP and YP associated with the first section and corresponding to said X and Y relays respectively, means for closing either main relay for the first section when the associated track relay is open and the associated push button is closed provided the other relays for such section are open, and

for subsequently keeping such main relay closed as long as such track relay and both auxiliary relays for the section remain open; means for closing either auxiliary relay for the first section when the associated main relay and the track relay for the second section are closed and for keeping it closed until such track relay opens; means for closing either main relay for each succeeding section when the associated track relay is open and the corresponding auxiliary relay for the section next in the rear is closed, and for keeping it closed until such track relay closes; means for closing either auxiliary relay for each of said succeeding sections when the associated main relay and the track relay for the section next in advance are closed; an X and a Y and a track indicating lamp for each section, means for lighting the track indicating lamp for each section when the associated track relay is open and the associated main relays are open, and means for lighting either the X or the Y lamp for each section when the associated track relay is open and the corresponding main relay is closed.

4. In combination, a stretch of railway track divided into a plurality of successive sections, a track relay for each section, a main X relay and a main Y relay for each section, an auxiliary X relay and an auxiliary Y relay for each section, two normally open push buttons XP and YP associated with the first section and corresponding to said X and Y relays respectively, means for closing either main relay for the first section when the associated track relay is open and the associated push button is closed provided the other relays for such section are open, and for subsequently keeping such main relay closed as long as such track relay and both auxiliary relays for the section remain open; means for closing either auxiliary relay for the first section when the associated main relay and the track relay for the second section are closed and for keeping it closed until such track relay opens; means for closing either main relay for each succeeding section when the associated track relay is open and the corresponding auxiliary relay for the section next in the rear is closed, and for keeping it closed until such track relay closes; means for closing either auxiliary relay for each of said succeeding sections when the associated main relay and the track relay for the section next in advance are closed; indicating means controlled by said main and auxiliary relays, and other means associated with said first section for indicating the conditions of the main and auxiliary relays for such section.

5. In combination, a stretch of railway track divided into a plurality of successive sections, a track relay for each section, a main X relay and a main Y relay for each section,

an auxiliary X relay and an auxiliary Y relay for each section, two normally open push buttons XP and YP associated with the first section and corresponding to said X and Y relays respectively, means for closing either main relay for the first section when the associated track relay is open and the associated push button is closed provided the other relays for such section are open, and for subsequently keeping such main relay closed as long as such track relay and both auxiliary relays for the section remain open; means for closing either auxiliary relay for the first section when the associated main relay and the track relay for the second section are closed and for keeping it closed until such track relay opens; means for closing either main relay for each succeeding section when the associated track relay is open and the corresponding auxiliary relay for the section next in the rear is closed, and for keeping it closed until such track relay closes; means for closing either auxiliary relay for each of said succeeding sections when the associated main relay and the track relay for the section next in advance are closed; indicating means controlled by said main and auxiliary relays, and manually operable means associated with said first section for opening either of the main or either of the auxiliary relays for such section.

6. In combination, a stretch of railway track divided into a plurality of successive sections, a track relay for each section, a main X relay and a main Y relay for each section, an auxiliary X relay and an auxiliary Y relay for each section, means for closing either main relay for the first section when the associated track relay is open, provided the other relays for such section are open and for subsequently keeping such main relay closed as long as such track relay and both auxiliary relays for the section are open, means for closing either auxiliary relay for the first section when the associated main relay and the track relay for the second section are closed, and for keeping it closed until such track relay opens, means for closing each main relay for each succeeding section when the associated track relay is open and the corresponding auxiliary relay for the section next in the rear is closed and for keeping it closed until such track relay closes, means for closing either auxiliary relay for each of said succeeding sections when the associated main relay and the track relay for the section next in advance are closed, and indicating means controlled by said main and auxiliary relays.

7. In combination, a stretch of railway track divided into a plurality of sections, a main X relay and a main Y relay for each section, an auxiliary X relay and an auxiliary Y relay for each section, means for closing either main relay for the first section provided the other relays for such section are open, and for subsequently keeping such main relay closed as long as a train occupies the section, means for closing either auxiliary relay for the first section when the associated main relay is closed and the second section is unoccupied, and for keeping it closed until a train enters the second section, means for closing the main relay for each succeeding section when the section is occupied and the corresponding auxiliary relay for the section next in the rear is closed, and for keeping it closed as long as the section is occupied, means for closing either auxiliary relay for each of said succeeding sections when the associated main relay is closed and the next section in advance is unoccupied, an X and a Y indicating lamp for each section, and means for lighting either lamp for each section when the corresponding main relay is closed.

8. In combination, a stretch of railway track divided into a plurality of sections, a main X relay and a main Y relay for each section, an auxiliary X relay and an auxiliary Y relay for each section, means for closing either main relay for the first section provided the other relays for such section are open, and for subsequently keeping such main relay closed as long as a train occupies the section, means for closing either auxiliary relay for the first section when the associated main relay is closed and the second section is unoccupied, and for keeping it closed until a train enters the second section, means for closing the main relay for each succeeding section when the section is occupied and the corresponding auxiliary relay for the section next in the rear is closed, and for keeping it closed as long as the section is occupied, means for closing either auxiliary relay for each of said succeeding sections when the associated main relay is closed and the next sec-

tion in advance is unoccupied, an X and a Y and a track lamp for each section, means for lighting the track lamp for each section when the section is occupied and the associated main relays are open, and means for lighting either the X or the Y lamp for each section when the section is occupied and the corresponding main relay is closed.

In testimony whereof I affix my signature.

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