

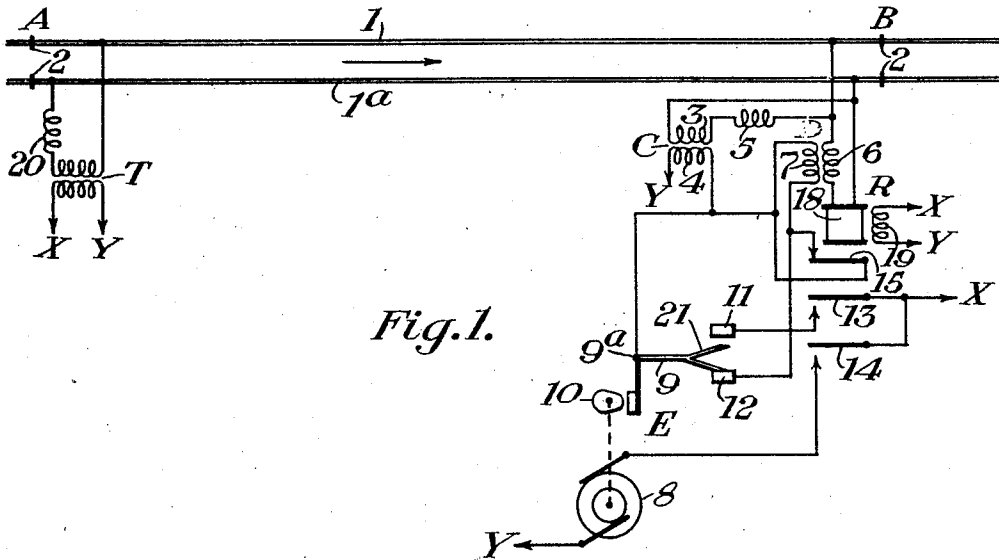
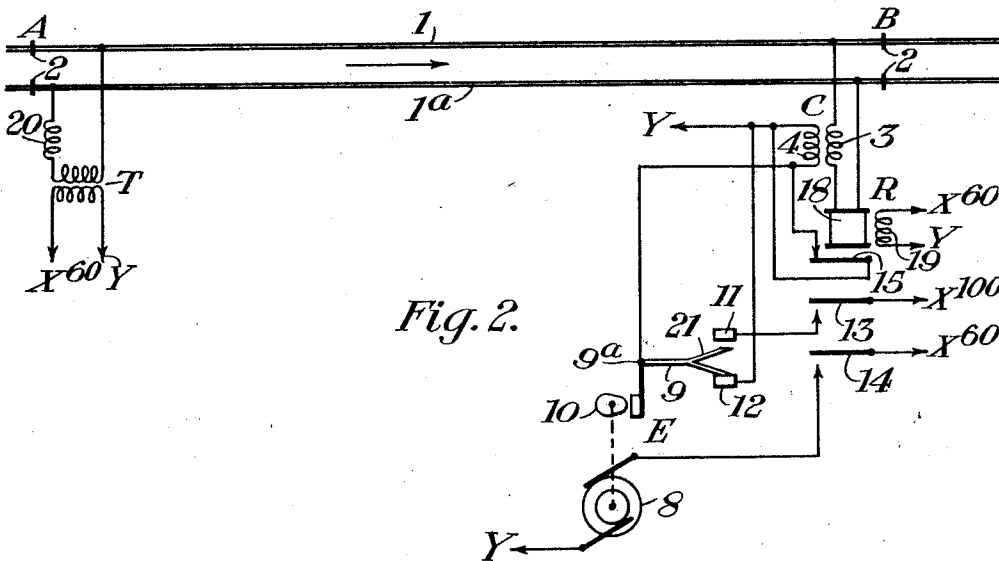
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RAILWAY TRAFFIC CONTROLLING APPARATUS

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RAILWAY-TRAFFIC-CONTROLLING APPARATUS.

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My invention relates to railway traffic controlling apparatus, and particularly to apparatus of the type wherein alternating train governing energy is periodically applied to the track rails for the control of train carried governing mechanism. The present invention relates to the trackway portion of such apparatus, and specifically to track circuits in which the source of track circuit current is located at the entrance end of the section and the track relay is located at the exit end.

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

In the accompanying drawing, Fig. 1 is a diagrammatic view showing one form of apparatus embodying my invention and suitable for use where the train governing current and the track circuit current are of the same frequency. Fig. 2 is a diagrammatic view showing a modified form of apparatus embodying my invention and suitable for use where the track circuit current and the train governing current are of different frequencies.

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

Referring first to Fig. 1, the reference characters 1 and 1^a designate the track rails of a railway along which traffic normally moves in the direction indicated by the arrow. These rails are divided by insulated joints 2 into a plurality of track sections, of which only one section A—B is shown in the drawing. This section is provided with a track circuit comprising a transformer T located at the entrance end of the section and a track relay R located at the exit end. The secondary of transformer T is connected across the track rails through a limiting inductance 20, and the primary of this transformer is connected with the terminals X and Y of a suitable source of alternating current which is not shown in the drawing. The track relay R comprises two windings 18 and 19, the former of which is connected across the track rails through a winding 6, and the latter of which is connected with the terminals X and Y of the source of alternating current.

Alternating train governing current is supplied to the rails at the exit end of the

section by a transformer C, the secondary 3 of which is connected across the rails through a limiting inductance 5. The primary 4 of transformer C is at times supplied with alternating train governing current which is periodically interrupted by a coding device E.

The coding device E comprises a motor 8 operating a cam 10 which controls a rocker arm 9 carrying a double contact finger 21, which contact finger is adapted for engagement with a fixed contact 12 or a fixed contact 11. The rocker arm 9 is pivoted at the point 9^a and is biased to such position that the contact finger 21 engages the fixed contact 12. When the rocker arm 9 is swung in counter-clockwise direction by the cam 10, the contact finger 21 is lifted out of engagement with the fixed contact 12 and into engagement with the fixed contact 11.

The circuit for the primary 4 of transformer C is from terminal X, through back contact 13 of track relay R, contact 11—21 of coding device E, and the primary of transformer 4 to terminal Y of the source of alternating current. It will be seen that when track relay R is de-energized and the coding device E is in operation, alternating current will be periodically applied to the track rails through the transformer C, due to the periodic opening and closing of contact 11—21 of the coding device. Motor 8 is provided with a circuit which passes from terminal X, through back contact 14 of relay R and the motor 8 to terminal Y. The coding device E is operated, therefore, when and only when track relay R is de-energized.

The winding 6 is in mutual inductive relation with a second winding 7, and this winding 7 is placed on closed circuit by contact 12—21 of the coding device E when the device is at rest in such position that this contact is closed. It follows that when the coding device E is in operation alternating train governing current is periodically applied to the track rails, and during the application of train governing current the winding 7 is on open circuit, so that the inductive effect of winding 6 is relatively high with the result that this winding prevents train governing current of an appreciable amount from entering winding 18 of track relay R. The relative instantaneous polarity

of the train governing current applied to transformer C is opposite to that of the track circuit current applied to the rails by transformer T, so that the relay R cannot be picked up by the train governing current. The winding 6 limits the train governing current in winding 18 of relay R to such an amount as not to keep this relay from picking up on the track circuit current when a train leaves the section. During each interval between applications of train governing current, winding 7 is placed on short circuit by contact 12—21 of coding device E, thereby reducing the inductive effect of winding 6 and permitting relay R to be effectively energized by track circuit current when a train leaves the section.

The coding device E is of the motor-operated type, so that there is no assurance that when this device becomes de-energized it will come to rest in such position that contact 12—21 is closed. It is important, however, that winding 7 should be placed on closed circuit when a train leaves section A—B, and in order to insure this I provide a second circuit for winding 7, which circuit includes a front contact 15 of track relay R.

The operation of the apparatus shown in Fig. 1, is as follows: Normally the track relay R is energized by track circuit current from transformer T, so that contacts 13 and 14 are open, with the result that the coding device E is at rest and train governing current is not supplied to the track rails through transformer C. Winding 7 is on closed circuit, because front contact 15 is closed, and also because contact 21—12 is closed, and so the inductive effect of winding 6 is minimum. When a train moving in the direction indicated by the arrow enters section A—B, it shunts the track circuit current from winding 18 of relay R, so that this relay opens, and the closing of back contacts 13 and 14 causes periodic application of train governing current to the track rails through transformer C. When the train leaves the section, track relay R will close during the first interval between applications of train governing current, that is, the first time that contact 12—21 of coding device E closes. Contact 15 of track relay R will then place winding 7 on closed circuit, so that it is immaterial whether or not the coding device E comes to rest with its contact 12—21 closed.

Referring now to Fig. 2, the apparatus shown in this view is similar to that shown in Fig. 1, except that the secondary 3 of transformer C, which supplies train governing current, is interposed between winding 18 of track relay R and the track rail 1. This means that the train governing current is passed through track relay winding 18, and this is possible because the train governing current is of a frequency different from

that of the track circuit current. For example, the track circuit frequency may be 60 cycles per second and the train governing frequency may be 100 cycles per second. The circuit for motor 8 of coding device E is the same as in Fig. 1, and the circuit for primary 4 of transformer C is also the same as in Fig. 1, except that this circuit passes from terminal X¹⁰⁰ of a source of 100 cycle current to a terminal Y which is common to both sources. When contact 12—21 of coding device E is closed, the primary 4 of transformer C is placed on closed circuit, and the primary 4 is provided with a second closed circuit which includes front contact 15 of track relay R. It follows that with the apparatus shown in Fig. 2, when a train occupies the section A—B, 100-cycle current will be periodically applied to the track rails through transformer C, and during the intervals between the applications of this current the primary 4 of transformer C will be placed on closed circuit. When a train leaves the section, track relay R will pick up on track circuit current the first time that contact 12—21 of coding device E closes, and thereafter primary 4 will be on closed circuit through front contact 15 of track relay R even if contact 12—21 should not remain closed, so that the inductive effect of the secondary 3 is minimum.

Although I have herein shown and described only two forms 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 section of railway track, a source of track circuit current connected with the rails at the entrance end of said section, a track relay connected with the rails at the exit end of said section, means including a motor and a contact operated thereby for periodically applying alternating train governing current to the rails at the exit end of said section when the track relay is de-energized, two windings in mutual inductive relation one of which is interposed between said track relay and a track rail, means including a contact operated by said motor for placing the second of said windings on closed circuit during each interval between applications of train governing current to the rails, and a second closed circuit for said second winding including a front contact of said track relay.

2. In combination, a section of railway track, a source of track circuit current connected with the rails at the entrance end of said section, a track relay connected with the rails at the exit end of said section, a transformer having its secondary interposed

between said track relay and a track rail, means including a motor and a contact operated thereby for periodically applying alternating train governing current to the primary of said transformer when said relay is de-energized, means including a contact operated by said motor for placing said primary on closed circuit during each interval between applications of train governing current to the primary, and a second closed circuit for said primary including a front contact of said relay.

3. In combination, a section of railway track, a source of track circuit current connected with the rails at the entrance end of said section, a track relay connected with the rails at the exit end of said section, two windings in mutual inductive relation one of which is interposed between said relay and a track rail, means including a motor and a contact operated thereby for periodically placing the second of said windings on closed circuit when said relay is de-energized, and a second closed circuit for said

second winding including a front contact of said relay. 25

4. In combination, a section of railway track, a source of track circuit current connected with the rails at the entrance end of said section, a track relay connected with the rails at the exit end of said section, two windings in mutual inductive relation one of which is interposed between said relay and a track rail, means including a motor and a contact operated thereby for periodically placing the second of said windings on closed circuit when said relay is de-energized, means including a contact operated by said motor for applying alternating train governing current to the rails at the exit end of said section during the intervals in which said second winding is not on closed circuit, and a second closed circuit for said second winding including a front contact of said relay. 30 35 40 45

In testimony whereof I affix my signature.

ROBERT M. GILSON.