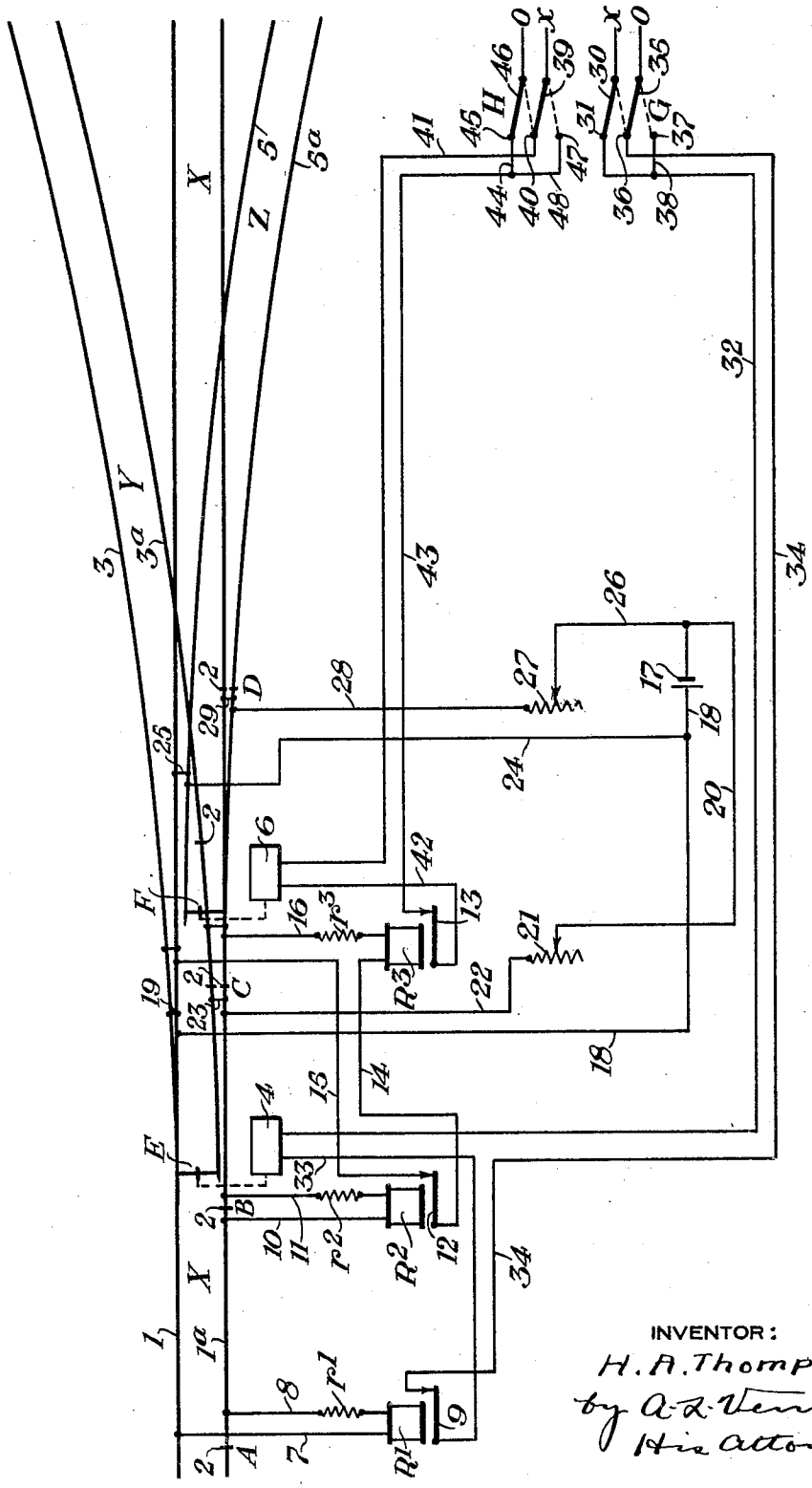
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RAILWAY TRAFFIC CONTROLLING APPARATUS

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RAILWAY-TRAFFIC-CONTROLLING APPARATUS

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My invention relates to railway traffic controlling apparatus, and particularly to apparatus for controlling the operation of lap switches in classification yards.

One of the features of my invention is the provision, in apparatus of the type described, of means for successively preventing the operation of a plurality of train controlling devices, specifically switches, when a car or a train advances within a predetermined distance from the first switch and for automatically rendering the switches operable in succession in the rear of the car or train.

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

The single figure of the accompanying drawing is a diagrammatic view illustrating one form of railway traffic controlling apparatus embodying my invention.

Referring to the drawing, my invention is illustrated as being embodied in a system which includes a railway track X, comprising a rail 1 and a rail 1^a which is divided into sections A—B, B—C and C—D by insulating joints 2. A siding Y, comprising rails 3 and 3^a, is connected with section B—C of the track X by a switch E which is movable between normal and reverse positions by a suitable operatitng mechanism 4. A siding Z, comprising rails 5 and 5^a, is also connected with section C—D of the track X by a switch F which is movable between normal and reverse positions by a suitable operating mechanism 6.

A first track relay R^1 is connected across the rails 1 and 1^a adjacent the left-hand end of the section A—B, as viewed in the drawing, by wires 7 and 8 respectively, and is provided with a front contact 9. A second track relay R^2 is connected in series with the track relay R^1 by wires 10 and 11 which are connected with the rail 1^a on opposite sides of the insulating joint 2 between sections A—B and B—C, and is provided with a front contact 12. A third track relay R^3, provided with a front contact 13 is connected across the left-hand end of the section C—D of the track X through a wire 14, front contact 12 of track relay R^2, and a wire 15 connected with the rail 1^a. The track circuit for the relays R^1 and R^2 is supplied with current from a battery 17, one terminal of which is connected with the rail 1 through a wire 18, and thence to the rail 3 of the siding Y through a jumper 19. The other terminal of the battery 17 is connected with the rail 1^a of section B—C through a wire 20, variable resistance 21, and a wire 22, and thence to the rail 3^a of siding Y by a jumper 23. The track circuit for the track relay R^3 is also supplied with current from the battery 17, one terminal of which is connected with the rail 5 of siding Z through wires 18 and 24, and thence to the rail 1 of the track X by a jumper 25. The other terminal of battery 17 is connected with the rail 5^a of the siding Z through a wire 26, variable resistance 27, and wire 28, and thence to the rail 1^a of section C—D of the track X by a jumper 29. If desired, resistors r^1, r^2 and r^3 may be inserted in series with the track relays R^1, R^2 and R^3, respectively, so as to insure that their contacts 9, 12 and 13 open quickly when the relays are shunted as by a train.

By means of the arrangement shown, it will be apparent that the track relays R^1 and R^2 are series connected and will be deenergized successively by an eastbound train, and that there is an interval of time during which the section B—C is occupied that both of the relays R^1 and R^2 are deenergized. Also, it will be apparent that the track relay R^3 operates in a circuit independent from the track circuit of the relays R^1 and R^2 but is controlled in part by the contact 12 of the track relay R^2.

The switch operating mechanism 4 is energized to move the switch E to its normal position by electric current of normal polarity which traverses a circuit passing from a terminal x of a suitable source of electric energy through contact 30—31 of a manually operable pole-changing device G, wire 32, switch operating mechanism 4, wire 33, front contact 9 of track relay R^1, wire 34, and contact 36—35 of pole-changing device G to the other terminal o of the same source of current. If it is desired to reverse the polarity of the

current in order to move the switch E to its reverse position, the pole-changing device G is shifted to the position shown in broken lines in which the contact arm 30 engages contact 36 and the contact arm 35 engages a third contact 37 which is connected to the wire 32 by a wire 38.

The switch operating mechanism 6 is also energized to move the switch F to its normal position by electric current of normal polarity which traverses a circuit passing from terminal *x*, through contact 39—40 of a second manually operable pole-changing device H, wire 41, switch operating mechanism 6, wire 42, front contact 13 of track relay R^3, wires 43 and 44, and contact 45—46 of pole-changing device H to terminal *o*. If it is desired to reverse the polarity of the current in order to move the switch F to its reverse position, the pole-changing device H is shifted to the position also shown in broken lines in the drawing, in which the contact arm 46 engages the contact 40 and the contact arm 39 engages a third contact 47 which is connected to the wire 43 by a wire 48.

With the parts in the condition shown in the drawing in which the tracks X, Y and Z are unoccupied and the track relays R^1, R^2 and R^3 are energized, it is apparent that the circuits controlling the switch operating mechanisms 4 and 6 are intact, thereby permitting either or both of the switches E and F to be operated between their normal and reverse positions.

I will now assume that an eastbound train, that is, a train moving from left to right as shown in the drawing, enters section A—B. This causes the track relay R^1 to become deenergized and open its front contact 9, thereby opening the circuit previously traced through this contact which controls the operation of the switch operating mechanism 4, thus preventing the switch E from being moved to its reverse position directly in front of or beneath the train. As the forward part of the train reaches section B—C, it shunts the track relay R^2, causing it to open its front contact 12 and open the track circuit previously traced through this contact, thereby causing the deenergization of the track relay R^3. This causes the contact 13 of track relay R^3 to open the circuit previously traced through this contact which controls the operation of the switch operating mechanism 6, thus also preventing the switch F from being moved to its reverse position. As the forward portion of the train enters section C—D, it shunts the track relay R^3 which has been previously deenergized by the opening of the contact 12 of the track relay R^2.

When the rear end of the train departs from section B—C, the track relays R^1 and R^2 again become energized and close their contacts 9 and 12, respectively. The closing of contact 9 of track relay R^1 completes the circuit through the switch operating mechanism 4, thereby permitting the operation of the switch E for succeeding trains. The closing of the contact 12 of track relay R^2 does not, however, cause the reenergization of the track relay R^3 for the reason that this relay is shunted by the train in section C—D. The contact 13 of track relay R^3 therefore remains open in the circuit which controls the switch operating mechanism 6.

When the rear portion of the train departs from section C—D, the track relay R^3 again becomes energized and closes its front contact 13. This completes the circuit through the switch operating mechanism 6 and renders the switch operable for succeeding trains.

I will now trace the operation of the apparatus for the movement of a single eastbound car through the three track sections shown in the drawing, assuming that the distance between the front and the rear trucks of the car is greater than the length of any one of these three track sections, but that it is less than the sum of the lengths of sections A—B and B—C or of sections B—C and C—D.

The wheels of the front truck of the car, upon entering section A—B, deenergize relay R^1, as already described for a train, preventing any movement of switch E. The wheels of the front truck, upon entering section B—C, deenergize relay R^2 and retain relay R^1 in its deenergized condition, and upon entering section C—D, they shunt relay R^3 which is, however, already deenergized on account of its circuit having already been opened at contact 12 of relay R^2.

The wheels of the rear truck have entered section A—B while the wheels of the front truck were moving through section B—C. When the wheels of the front truck leave section B—C, relay R^2 will become energized, but the wheels of the rear truck, having entered section A—B, prevent relay R^1 from becoming energized. The wheels of the rear truck, after having section A—B, continue to shunt relay R^1 as long as they occupy section B—C. The wheels of the rear truck enter section B—C while the wheels of the front truck are moving through section C—D. When the wheels of the front truck leave section C—D, relay R^3 can not become energized, relay R^2 having been deenergized by the wheels of the rear truck. The wheels of the rear truck, on leaving section B—C, will be occupying section C—D and will hence prevent relay R^3 from becoming energized.

While I have described the operation of my invention with the switches E and F in their normal positions only, it will be apparent that these switches are in a like manner successively prevented from being moved if either or both of them occupy a reverse position when a car or a train moves through sections A—B, B—C and C—D.

From the foregoing, it will be evident that the track relay R^1 functions as a detector relay for both the sections A—B and B—C in that it becomes deenergized when a train enters section A—B and remains in this condition until the train departs from section B—C. Also, it will be apparent that the track relay R^3 functions as a detector relay for both of the sections B—C and C—D in that it becomes deenergized by the opening of the contact 12 of track relay R^2 when this relay becomes deenergized when a train enters section B—C, and that the relay R^3 remains in a deenergized condition until the train departs from section C—D. In this respect, the operation of the relays R^1 and R^3 may be said to overlap one another, and they positively prevent the operation of the switches E and F when a train reaches a predetermined distance from each of these switches, respectively, and while the train is passing over them. In other words, there are times, first, when only the switch E is locked against movement, second, when both of the switches E and F are rendered ineffective, and third, when only switch F is prevented from being moved, according to the position of the train in the several sections. It will also be apparent that the track relays R^1 and R^2 operate in series in the same track circuit, and that the relay R^3 operates in a separate track circuit.

If, instead of the arrangement provided by my invention, a separate track circuit were provided for each of the three track sections A—B, B—C and C—D, and if each of these three track circuits were independent of the others, incorrect control of the switches E and F might result, as can readily be understood. For example, if section A—B had a track circuit which was independent of the track circuit for section B—C, relay R^1 might close its contact 9 before the track relay for section B—C opened its front contact. This is because track relays, when being shunted, are slower in releasing their contacts than they are in picking up their contacts when the shunt is removed. Similarly, if section B—C had a track circuit which was independent of the track circuit for section C—D, the relay for section B—C might close its front contacts before the relay for section C—D opened its front contacts when the wheels of the front truck of a car entered section C—D and left section B—C.

It will be easily understood that apparatus embodying my invention. as herein shown and described, could also be used for preventing an undesirable momentary operation of a signal when a light engine or a car passes at high speed from one track section to another.

Although I have herein shown and described only one form of railway traffic controlling 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 sections, a first track circuit including one of said sections and a track relay, a second track circuit including more than one of said sections and a plurality of series-connected track relays, a first traffic governing device associated with one of said sections, a second traffic governing device associated with another of said sections, means controlled by one of said series-connected track relays for controlling one of said traffic governing devices, means controlled by said first-mentioned track relay for controlling another of said traffic governing devices, and means controlled by another of said series connected relays for controlling said first-mentioned track relay.

2. In combination, a stretch of railway track divided into a plurality of sections, a first track circuit including one of said sections and a track relay, a second track circuit including more than one of said sections and a plurality of series-connected track relays, a first traffic governing device associated with one of said sections, a second traffic governing device associated with another of said sections, means controlled by a front contact of one of said series-connected track relays for controlling said first traffic governing device, means controlled by said first-mentioned track relay for controlling said second traffic governing device, and means controlled by a front contact of another of said series-connected relays for controlling said first-mentioned track relay.

3. In combination, a stretch of railway track divided into a plurality of sections, a first track circuit including one of said sections and a first track relay, a second track circuit including more than one of said sections and a second and a third track relay connected in series, a first track switch associated with one of said sections, a second track switch associated with another of said sections, means controlled by said second track relay for controlling said first switch, means controlled by said first track relay for controlling said second switch, and means controlled by said third track relay for controlling said first track relay.

4. In combination, a stretch of railway track divided into a plurality of sections, a first track circuit including one of said sections and a first track relay, a second track circuit including more than one of said sections and a second and a third track relay connected in series, a first track switch as-

sociated with one of said sections, a second track switch associated with another of said sections, means controlled by a front contact of said second track relay for controlling said first switch, means controlled by said first track relay for controlling said second switch, and means controlled by said third track relay for controlling said first track relay.

5. In combination, a stretch of railway track divided into a plurality of sections, a first track circuit including one of said sections and a track relay, a second track circuit including more than one of said sections and a plurality of series-connected track relays, a first track switch associated with one of said sections, a second track switch associated with another of said sections, means controlled by a front contact of one of said series-connected track relays for controlling said first track switch, means controlled by said first-mentioned track relay for controlling said second track switch, and means controlled by a front contact of another of said series-connected relays for controlling said first-mentioned track relay.

6. In combination, a stretch of railway track divided into three successive sections, a track switch, a second track switch, a track circuit including the first and second said sections connected in series with each other through the winding of a track relay one terminal of which is connected with said first section and the other terminal of which is connected with said second section, a track battery connected across the rails of said second section for supplying current to said track circuit, a second track relay connected across the rails of said first section, a second track circuit for said third section including a third track relay connected across the rails of said third section through a front contact of said first track relay, means controlled by said second track relay for controlling said first switch, and means controlled by said third track relay for controlling said second switch.

7. In combination, a stretch of railway track comprising a first section and a second section adjoining said first section as well as a third section adjoining said second section, a track switch located in said third section, a second track switch located in said second section, a track circuit including said first and second sections in series and supplied with current by a source connected across the rails of said second section, a control device through the winding of which said first and second sections are interconnected, a second control device connected across the rails of said first section, a third control device, a second track circuit including said third section and said third control device and controlled by said first control device, means controlled by said second control device for controlling said second switch, and means controlled by said third control device for controlling said first switch.

8. In combination, a first and a second as well as a third section of railway track, a traffic governing device, a second traffic governing device, a track circuit including said first and second sections in series and supplied with current by a source connected with the rails of said second section, a control device controlled by current flowing from one of the sections in said track circuit to the other, a second control device connected with the rails of said first section, a third control device, a second track circuit including said third section and said third control device and controlled by said first control device, means controlled by said second control device for controlling said second traffic governing device, and means controlled by said third control device for controlling said first traffic governing device.

9. In combination, a first and a second as well as a third section of railway track, a traffic governing device, a second traffic governing device, a track circuit for said first and second sections, a second track circuit for said third section controlled by said first track circuit, means controlled by said second track circuit for controlling said second traffic governing device, and means controlled by said first track circuit for controlling said first traffic governing device.

In tetsimony whereof I affix my signature.

HOWARD A. THOMPSON.