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RAILWAY TRAFFIC CONTROLLING APPARATUS

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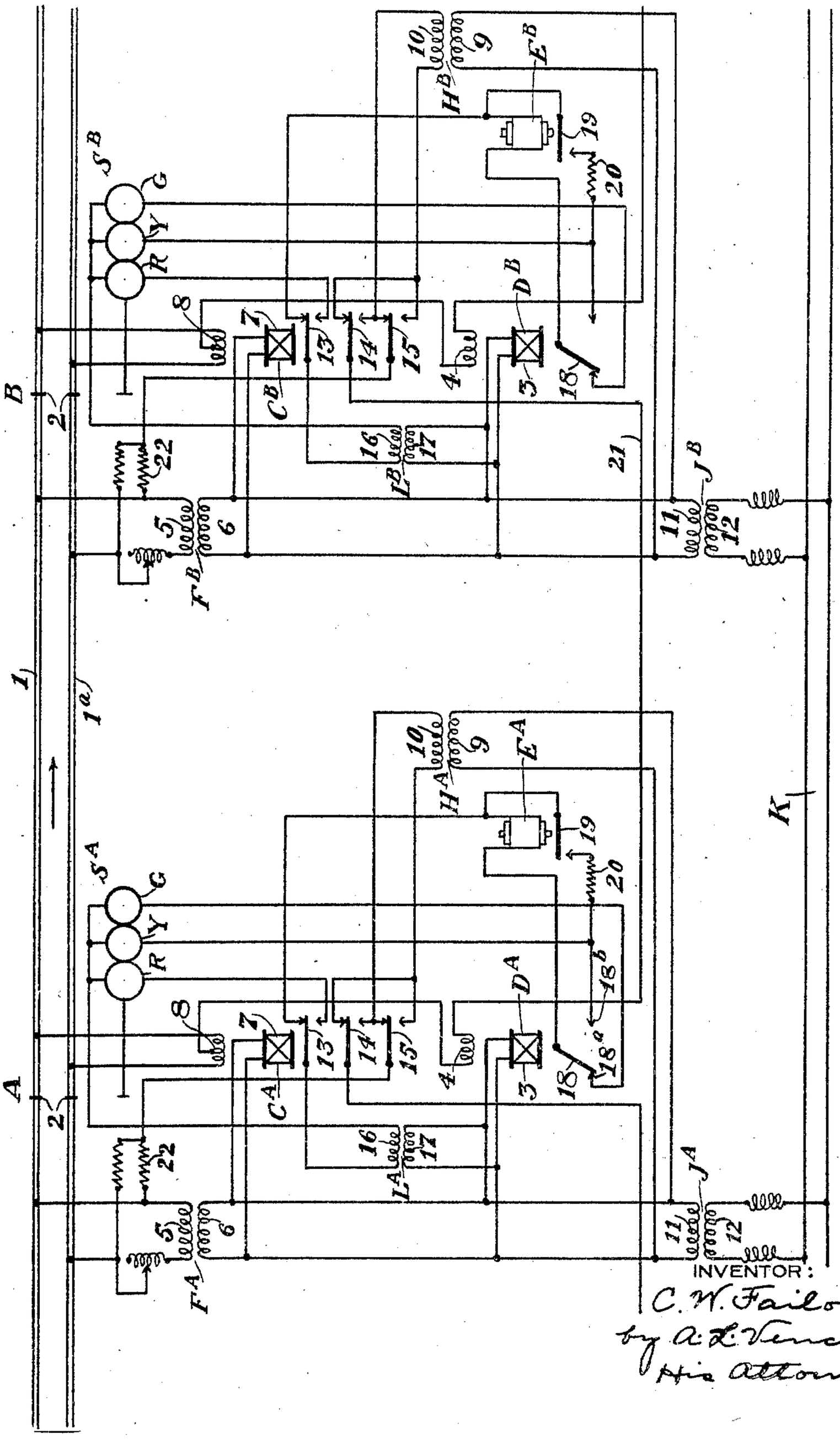

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RAILWAY-TRAFFIC-CONTROLING APPARATUS.

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My invention relates to railway traffic controlling apparatus, and particularly to apparatus of the type wherein train-carried governing mechanism is controlled by energy received from the trackway. More specifically the present invention relates to the trackway portion of such apparatus.

I will describe one form of apparatus 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 apparatus embodying my invention.

Referring to the drawing, 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.

The track section A—B is provided with a track circuit comprising a source of current at the exit end and a track relay at the entrance end. As here shown, the source of track circuit current is a transformer F^B, having its secondary 5 connected across the rails 1 and 1^a, and its primary 6 connected with the secondary 11 of a line transformer J^B. The primary 12 of transformer J^B is constantly supplied with alternating current from a transmission line K. The track relay for section A—B is designated C^A and has a winding 8 connected across the rails of the section. This relay also has a second winding 7 supplied with energy from the secondary 11 of a transformer J^A, the primary 12 of which is connected with the transmission line K. It will be seen, therefore, that the track circuit includes the two track rails 1 and 1^a in series.

The section A—B is also provided with a loop circuit which includes the two rails 1 and 1^a in multiple. When track relay C^B for the section next in advance is energized, the loop circuit for section A—B is from secondary 10 of a transformer H^B, through front contact 14 of relay C^B, wire 21, winding 4 of a relay D^A to the middle point of winding 8 of relay C^A, and then through the rails 1 and 1^a in multiple to a resistance 22 from the middle point of which the circuit passes through the front contact 15 of relay C^B to the secondary 10 of transformer H^B. When track relay C^B is de-energized, the circuit is the same except that the primary 10 of transformer H^B is reversely connected with the wire 21 and the track rails. In the first instance, that is, when track relay C^B is energized, the loop circuit is supplied with current of what I will term "normal relative polarity", whereas when track relay C^B is de-energized, the loop circuit is supplied with what I will term current of reverse relative polarity. The primary 9 of transformer H^B is constantly supplied with alternating current from the secondary 11 of the line transformer J^B.

It will be noted that a winding 4 of relay D^A is included in the loop circuit for section A—B. This relay also comprises a winding 3 which is constantly supplied with alternating current from the secondary 11 of the line transformer J^A, and so the relay D^A is responsive to reversals of the relative polarity of the current flowing in the loop circuit. When this current is of normal relative polarity, relay D^A is energized in the normal direction and contact 18 is swung to the left; when the current in the loop circuit is of reverse relative polarity, relay D^A is energized in the reverse direction and contact 18 is swung to the right.

Section A—B is provided with a signal S^A, comprising a proceed lamp G, a caution lamp Y, and a stop lamp R. The circuit for the proceed lamp is from the secondary 16 of a transformer L^A, through front contact 13 of track relay C^A, the winding of a checking relay E^A, normal contact 18—18^a of relay D^A, and the proceed lamp G to the secondary 16 of transformer L^A. The primary 17 of transformer L^A is constantly supplied with alternating current from the line transformer J^A. The normal circuit for the caution lamp Y is from secondary 16 through front contact 13, winding of relay E^A, reverse or right-hand contact 18—18^b of relay D^A, and lamp Y to secondary 16. The circuit for the stop lamp R is from secondary 16 through back contact 13 of relay C^A and the lamp R to secondary 16. The caution lamp Y is provided with an auxiliary circuit which passes from secondary 16 through front contact 13 of relay C^A, back contact 19 of checking relay D^A, resistance 20 and lamp Y to secondary 16.

It will be seen from the foregoing that when the track relay C^A is energized, and

relay D^A is energized in the normal direction, the proceed lamp G will be lighted; when track relay C^A is energized and relay D^A is energized in the reverse direction, the caution lamp Y will be lighted; and when relay C^A is de-energized the stop lamp R will be lighted. It will also be seen that when the track relay C^A is energized and the line relay D^A is energized in the normal direction, if the proceed lamp G should burn out the checking relay D^A will become de-energized, so that the auxiliary circuit through contact 19 of relay E^A will be closed, with the result that the caution lamp Y will be lighted. I thus avoid a dark signal and also avoid unnecessarily stopping a train as would be the case if the stop lamp R were lighted under the conditions just specified, it being noted that a caution indication is proper under these conditions, because section A—B is not occupied. It will further be seen that in the event of a failure of the loop circuit, line relay D^A will be de-energized, so that checking relay E^A will also be de-energized, with the result that caution lamp Y will be lighted if the track relay C^A is energized. The relay E^A, therefore, performs the double function of checking the integrity of the proceed lamp G and also the integrity of the loop circuit.

The apparatus herein shown is intended for cooperation with train-carried mechanism so arranged that a proceed indication is received on the train when the train is over a portion of track carrying track circuit current and also carrying loop current of normal relative polarity, that a caution indication is received on the train when the train is on a portion of track carrying loop current of reverse relative polarity and also track circuit current, and that a stop indication is received on the train in the absence of either loop current or track circuit current.

Signal S^B at location B is controlled by relays C^B, D^B and E^B in the same manner that signal S^A is controlled by the corresponding relays at location A.

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 section of railway track, a loop circuit for said section including the track rails in multiple and a winding of a line relay, and a checking relay and a signal controlled jointly by said line relay.

2. In combination, a section of railway track, a loop circuit for said section including the track rails in multiple and a winding of a line relay, a signal for said section controlled by said line relay, and a checking relay also controlled by said line relay for changing the indication given by said signal if the line relay becomes de-energized when said section is unoccupied.

3. In combination, a section of railway track, a loop circuit for said section including the track rails in multiple and a source of current, means for reversibly connecting said source with said loop circuit, a line relay having a winding included in said loop circuit and responsive to reversals of the connection of the source with said circuit, a signal, a proceed circuit for said signal including a normal contact of said line relay and a checking relay, a caution circuit for said signal including a reverse contact of said line relay and said checking relay, and an auxiliary caution circuit for said signal including a back contact of said checking relay.

4. In combination, a section of railway track, a loop circuit for said section including the track rails in multiple and a source of current, means for reversibly connecting said source with said loop circuit, a line relay having a winding included in said loop circuit and responsive to reversals of the connection of the source with said circuit, and a checking relay and a signal controlled jointly by said line relay.

5. In combination, a section of railway track, a loop circuit for said section including the track rails in multiple and a source of current, means for reversibly connecting said source with said loop circuit, a line relay having a winding included in said loop circuit and responsive to reversals of the connection of the source with said circuit, a signal for said section controlled by said relay and arranged to indicate proceed or caution according as the relay is energized in normal or reverse direction, and auxiliary means for causing said signal to indicate caution if said line relay becomes de-energized while the section is unoccupied.

6. In combination, a section of railway track, a track circuit for said section including the rails in series and a source of current as well as a winding of a track relay, a loop circuit for said section including the track rails in multiple and a winding of a line relay, a signal controlled jointly by said track relay and said line relay, and a checking relay for said signal controlled by said track relay and by said line relay and by said signal.

7. In combination, a section of railway track, a track circuit for said section including the rails in series and a source of current, a loop circuit for said section including the rails in multiple and a source of current, means for reversibly connecting said source with said loop circuit, a line relay having a winding included in said loop circuit and responsive to reversals of the connection of the source with said circuit, a signal, means

for causing said signal to indicate proceed when said track relay is energized and said line relay is energized in normal direction, means for causing said signal to indicate caution when said track relay is energized and said line relay is energized in reverse direction, means for causing said signal to indicate stop when said track relay is de-energized and auxiliary means for causing said signal to indicate caution when said track relay is energized and said line relay is de-energized.

8. In combination, a section of railway track, a track circuit for said section including the rails in series and a source of current, a loop circuit for said section including the rails in multiple and a source of current, means for reversibly connecting said source with said loop circuit, a line relay having a winding included in said loop circuit and responsive to reversals of the connection of the source with said circuit, a signal having proceed, caution and stop lamps, a circuit for said proceed lamp including a front contact of said track relay and a normal contact of said line relay and a checking relay, a circuit for said caution lamp including a front contact of said track relay and a reverse contact of said line relay and said checking relay, a circuit for said stop lamp including a back contact of said track relay, and an auxiliary circuit for said caution lamp including a back contact of said checking relay.

In testimony whereof I affix my signature.

CHARLES W. FAILOR.