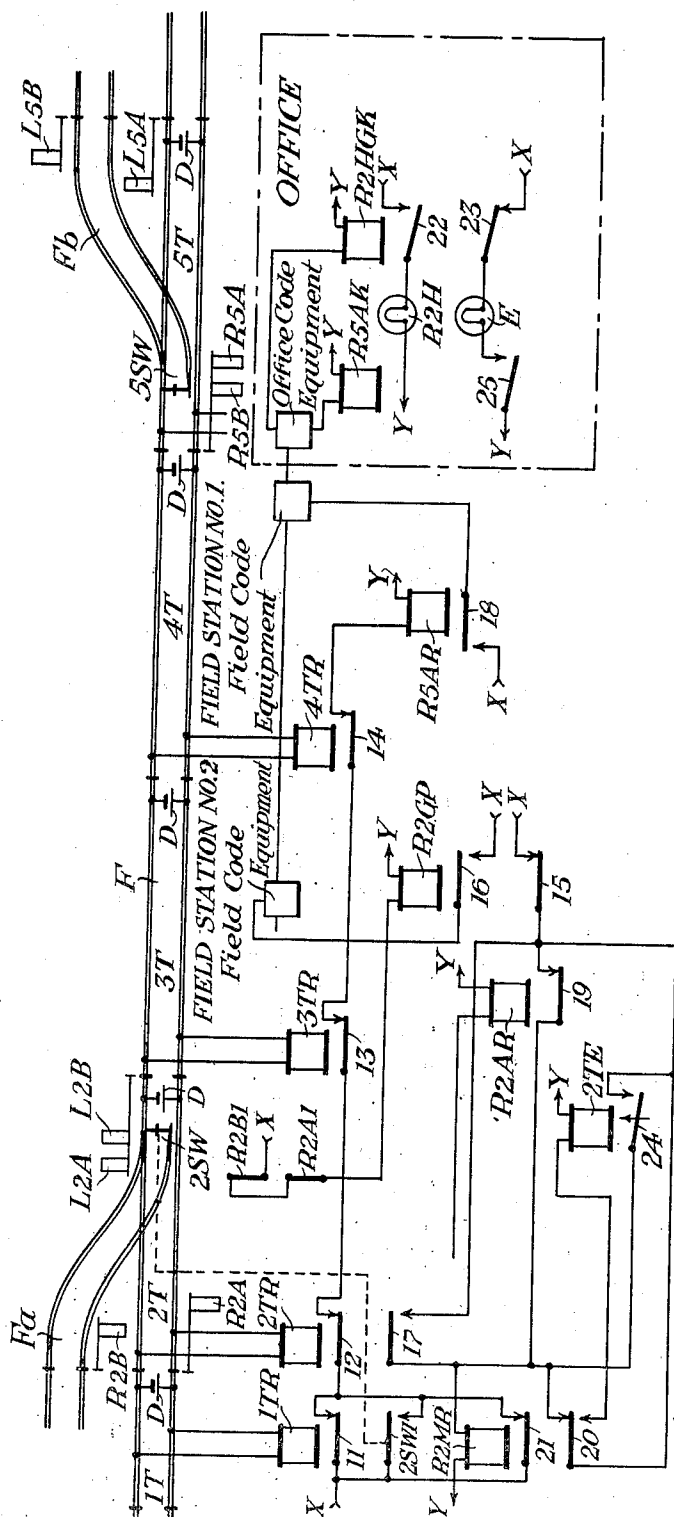


Feb. 2, 1937.

J. J. VANHORN
RAILWAY SIGNALING APPARATUS

2,069,342

Filed Oct. 22, 1935



INVENTOR
James J. Vanhorn
BY *A. J. Tuncill*
HIS ATTORNEY

UNITED STATES PATENT OFFICE

2,069,342

RAILWAY SIGNALING APPARATUS

James J. Vanhorn, Swissvale, Pa., assignor to
Union Switch & Signal Company, Swissvale,
Pa., a corporation of Pennsylvania

Application October 22, 1935, Serial No. 46,114

14 Claims. (Cl. 246—122)

My invention relates to railway signaling apparatus, and more particularly to apparatus for the control of a track occupied indication signal usually associated with a track model at a remote point (such as a dispatcher's office) and rendered active whenever the stretch of track represented by the track model becomes occupied.

A feature of my invention has to do with the control of such a signal by existing relays in such a manner as to avoid the necessity of providing an additional relay, with a separate line wire extending between the ends of the represented stretch, for controlling such signal.

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 character F designates a stretch of railway track which is provided with switches 2SW and 5SW at the respective ends thereof leading to branch tracks Fa and Fb, respectively.

The track F is divided into track sections 1T to 5T, the sections 2T and 5T being those which include the switches 2SW and 5SW. Each track section is provided with a track circuit comprising a battery D and a track relay designated by the reference character R with a suitable prefix designating the section to which it belongs. Eastbound traffic over the switch 5SW is governed by high and low speed signals R5A and R5B, respectively, and the signal R5A is provided with the usual distant signal R2A located at the entrance of track section 2T. This latter signal governs the movement of eastbound traffic over switch 2SW in its normal position. The low speed signal R2B associated with track Fa governs the movement of eastbound traffic over the switch 2SW in its reverse position. In a similar manner, signals L2A, L2B, L5A and L5B govern westbound traffic movements over switch 2SW in its normal and reverse positions and over switch 5SW in its normal and reverse positions, respectively.

An approach relay R5AR is provided for the stretch F. This relay is included in a circuit which passes from terminal X of a suitable source of current, through the front contacts 11 to 14 of track relays 1TR to 4TR, respectively, and the winding of relay R5AR to terminal Y of the same source. This circuit is provided with two branches around contact 11 of relay 1TR, one of which branches includes front contact 21 of an

approaching locking relay R2MR, while the other includes contact 2SW1 of switch 2SW closed only when switch 2SW is in its reverse position.

The approach locking relay R2MR is provided with a pick-up circuit which passes from terminal X, through front contact 15 of a signal repeating relay R2GP, front contact 19 of the usual approach relay R2AR for track sections to the rear of signal R2A, and the winding of relay R2MR, to terminal Y. The pick-up circuit for relay R2MR is provided with a branch around contact 19, which branch includes back contact 17 of track relay 2TR. The pick-up circuit for relay R2MR is also provided with another branch around contacts 19 and 17, which branch includes the front contact 24 of a time element relay 2TE. A stick circuit for relay R2MR is also provided and includes front contacts 15 and 26 of relays R2GP and R2MR, respectively. The time element relay 2TE is provided with a circuit which passes from terminal X, through front contact 15 of relay R2GP, back contact 20 of relay R2MR and the winding of relay 2TE, to terminal Y. The relay 2TE has no bearing on the present invention, but has been shown in order to complete the disclosure of the control circuits for relay R2MR. Relay R2MR controls the switch 2SW in such a manner that the switch cannot be operated unless the relay R2MR is energized. The signal repeater relay R2GP is normally energized over a circuit closed only while both signals R2A and R2B are in their stop position. This circuit passes from terminal X, through signal contacts R2B1 and R2A1 and the winding of relay R2GP, to terminal Y. The circuits and apparatus employed in operating the switches 2SW, 5SW and the various wayside signals have no bearing on the present invention and therefore have not been shown. For similar reasons the usual approach locking relay and associated circuits employed in connection with switch 5SW have not been shown.

For the purpose of obtaining a clear understanding of the present invention, it is assumed that the various switches and signals employed are controlled from a remote point (such as a train dispatcher's office) by a suitable centralized traffic control system wherein operation of the various pieces of apparatus in a field station causes code equipment thereat to function as required to operate appropriate indicating equipment in the office. In the present disclosure, only the apparatus and circuits considered necessary to a complete understanding of the invention have been shown. The right and left portions of the

stretch of track F and the associated switch and signals are designated "Field station No. 1" and "Field station No. 2", respectively, and the field code equipment of the centralized traffic control system is diagrammatically represented in the respective field stations by squares. The apparatus located at a point remote from the stretch of track F is shown within a dashed line enclosure, designated "Office", and includes a square representing the office code equipment of the traffic control system, indication control relays R5AK and R2HGK of such system having to do with the present invention, and lamps E and R2H controlled by these relays. Relay R2HGK is controlled by the signal repeating relay R2GP in Field station No. 2 which is released whenever signal R2A or R2B is cleared, and, in closing back contact 16 causes the field and office code equipment of the traffic control system to function in known manner as required to pick up indication control relay R2HGK. Relay R5AK is controlled by approach relay R5AR in a similar manner, that is, when R5AR releases its back contact 18 closes and causes the field and office code equipment to function as required to pick up indication relay R5AK.

The lamp E is provided to, when energized, indicate to an operator the occupied condition of that portion of track F extending between the home signal R5A and its distant signal R2A, and comprising track sections 2T to 4T, respectively. The lamp R2H is provided to, when energized, indicate to the operator that one of the signals R2A or R2B is displaying a proceed indication. The necessity of providing a separate relay, operated over an added line wire extended between signals R2A and R5A and controlled solely by the track relays of sections 2T or 4T intervening between these two signals, is avoided by placing the lamp E under the control of existing relays R2GP and R5AR and their code controlled relays R2HGK and R5AK, respectively. The lamp R2H is solely under the control of relay R2GP and its code controlled relay R2HGK. The lamp E is placed solely under the control of relay R5AR and its code controlled relay R5AK during such times that the control of the release of relay R5AR is solely under control of the track relays of sections 2T to 4T; while use is made of the existing relay R2GP and its code controlled relay R2HGK to prevent the release of relay R5AR from exercising any control over signal E when relay R5AR is released in response to section 1T becoming occupied after signal R2A has been cleared.

The operation of the apparatus shown in the drawing is as follows: In the absence of trains the circuits and apparatus are in the condition shown. When an eastbound train enters section 1T, relay 1TR releases its front contact 11, but without effect as the circuit for relay R5AR is maintained closed over the branch circuit including the front contact 21 of relay R2MR. If signal R2A is now cleared, relay R2GP releases and through the medium of back contact 16 and the code equipment causes relay R2HGK to become energized. When relay R2HGK picks up, it closes the circuit for lamp R2H at front contact 22, thereby notifying the operator that an R2 signal has cleared; and it also opens contact 23 in the circuit for lamp E. When relay R2GP released, it also opened the pick-up and stick circuits for relay R2MR at front contact 15. Relay R2MR accordingly releases to prevent movement of switch 2SW, and to open the circuit pass-

ing through relay R5AR at front contact 21. Relay R5AR accordingly releases and closes back contact 18, which, through the medium of the code equipment causes relay R5AK to be picked up. When relay R5AK picks up, it closes contact 25 in the circuit for lamp E, but without effect at this time, contact 23 being open.

If now the train advances into section 2T, relay 2TR releases and signal R2A is returned to the stop position in known manner. When relay 2TR releases, it opens contact 12 in the circuit for relay R5AR, and closes one of the branches in the pick-up circuit for relay R2MR at back contact 17. As soon as signal R2A returns to its stop position, relay R2GP again picks up, and by opening back contact 16 causes the code equipment to effect the deenergization of relay R2HGK. Relay R2GP also completes the pick-up circuit for relay R2MR at front contact 15 over the branch including back contact 17 of relay 2TR and relay R2MR accordingly again picks up. When relay R2HGK releases, it opens the circuit for lamp R2H at front contact 22, and at back contact 23 completes the circuit for lamp E which accordingly becomes lighted. Since the circuit for relay R5AR includes front contacts of relays 2TR, 3TR and 4TR of section 1T to 4T, respectively, it will be apparent that signal E will remain lighted until all of these sections, the territory between signals R2A and R5A, have been vacated.

If, with all sections unoccupied, as shown, the switch 2SW is moved to the reverse position, its contact 2SW1 closes the branch circuit around front contacts 11 and 21 of relays 1TR and R2MR, respectively, thereby preventing the circuit for relay R5AR from being opened when signal R2B is cleared or as a result of section 1T becoming occupied. If now signal R2B is cleared, it opens the circuit for relay R2GP at contact R2B1. Relay R2GP accordingly releases, and, in the manner already described, causes relay R2HGK to pick up and relay R2MR to release. When a train accepts the cleared signal R2B and enters section 2T the circuit for relay R5AR will be opened at front contact 12 of relay 2TR, and signal R2B will also return to its stop position. When relay R5AR releases, its back contact 18 closes and causes relay R5AK to pick up. As soon as contact R2B1 closes, relay R2GP will also pick up, thereby causing relay R2HGK to again become deenergized. When relay R2HGK releases, it completes the circuit for lamp E at back contact 23.

It will be apparent that a westbound train entering the stretch F will effect the release of track relay 4TR, which, in turn, will open the circuit for relay R5AR at front contact 14. Relay R5AR will accordingly close its back contact 18 and thereby cause the code equipment to function as required to pick up relay R5AK. Relay R5AK will accordingly pick up and complete the circuit for signal E and this circuit will be maintained closed until the train leaves section 2T.

It will be seen from the foregoing that by the use of two indication relays in the office of the traffic control system, controlled by existing relays at opposite ends of the stretch of track F, I am able to control the signal E as required to provide and indication of the occupied condition of that portion of the stretch of track between home signal R5A and its distant signal R2A without the necessity of providing an additional line wire between such signals.

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, a wayside signal for directing traffic into one end of said stretch, an approach relay at the other end of said stretch; means for deenergizing said approach relay when said stretch is occupied, means for also deenergizing said approach relay when a track section adjoining said stretch is occupied by a train approaching said wayside signal at clear, a signal for indicating the occupancy of any portion of the stretch and located in the office of a traffic control system associated with said stretch; and means in the office of the traffic control system jointly controlled by said approach relay and by said wayside signal for effecting actuation of said signal only when the stretch is occupied.

2. In combination, a stretch of railway track divided into a plurality of sections each provided with a track circuit including a track relay, signals at the ends of the stretch for directing traffic into and out of the stretch respectively, an approach relay having an energizing circuit including front contacts of the track relays of said sections, a relay remote from the stretch controlled by one of said signals, a second relay remote from the stretch controlled by said approach relay, and a signal jointly controlled by said latter two relays to indicate the occupancy of a portion of the stretch.

3. In combination, a stretch of railway track divided into a plurality of track sections each provided with a track circuit including a track relay, a signal for directing traffic movements over said sections, an approach relay having an energizing circuit including contacts of said track relays, a relay remote from the stretch controlled by said signal, a second relay remote from the stretch controlled by said approach relay, and a signal jointly controlled by said latter two relays to indicate the occupancy of one of said sections.

4. In combination, a stretch of railway track divided into a plurality of track sections each provided with a track circuit including a track relay, a signal for directing traffic movements over said sections, an approach relay having an energizing circuit including contacts of the track relays of said sections, a relay remote from the stretch controlled by said signal, a second relay remote from the stretch controlled by said approach relay, a first signal controlled solely by one of said latter two relays, and a second signal jointly controlled by said latter two relays.

5. In combination, a stretch of railway track divided into a plurality of sections each provided with a track circuit including a track relay, signals at opposite ends of the stretch for directing traffic into the stretch from the respective ends thereof, an approach relay having an energizing circuit including contacts of the track relays of said sections, an indication relay controlled by one of said signals, a second indication relay controlled by said approach relay, a signal for indicating the occupied condition of one or more sections of the stretch, and a circuit

for said latter signal completed by one of said indication relays after the stretch becomes occupied.

6. In combination, a stretch of railway track divided into a plurality of track sections each provided with a track circuit including a track relay, a wayside signal located at the junction of two adjoining sections for directing traffic through respective sections of the stretch in advance of said signal, a relay for the stretch normally energized over a circuit including a front contact of each track relay, a track occupied indication signal, means responsive to the release of said normally energized relay for energizing said track occupied indication signal, and means for preventing the release of said relay from effecting the energization of said track occupied indication signal until a section in advance of said wayside signal becomes unoccupied.

7. In combination, a stretch of railway track equipped with a switch, signals for directing traffic into the stretch over the switch in its normal and reverse positions respectively, a normally energized relay for said stretch, a track occupied indication signal, means for effecting the release of said relay when the stretch becomes occupied to effect the energization of said indication signal, means for effecting the release of said relay before the stretch becomes occupied providing a certain of said first signals has previously been cleared, and means controlled by the cleared signal for preventing the release of said relay from effecting the energization of said indication signal until after the stretch has become occupied and the cleared signal has returned to its stop position.

8. In combination, a stretch of railway track divided into a plurality of track sections each provided with a track circuit including a track relay, a signal located at one end of the stretch for directing traffic through respective sections of the stretch, an approach relay for the stretch normally energized over a circuit including a front contact of each track relay, a signal repeating relay released by the signal when the same is cleared, and a remotely disposed signal having an energizing circuit jointly controlled by said approach and signal repeating relays.

9. In combination, a stretch of railway track divided into a plurality of sections each provided with a track circuit including a track relay, signals at opposite ends of the stretch for directing traffic into the stretch from the respective ends thereof, an approach relay having an energizing circuit including contacts of the track relays of said sections, an indication relay controlled by one of said signals, a second indication relay controlled by said approach relay, a signal for indicating the occupied condition of one or more sections of the stretch, and a circuit for said latter signal completed by one of said indication relays when the stretch is entered from one end and completed by the other of said indication relays when the stretch is entered from the other end.

10. In combination, a stretch of railway track, a wayside signal located at an intermediate point along the stretch, a normally energized relay for the stretch, a track occupied indication signal, means for effecting the release of said relay whenever a section in advance of said wayside signal becomes occupied, means rendered effective when said wayside signal is at clear for also effecting the release of said relay while only a section to the rear of said wayside signal is occupied, and means effective if said relay releases when said wayside signal is at stop for causing the ener-

gization of said track occupied indication signal.

11. In combination, a stretch of railway track, a wayside signal located at an intermediate point along the stretch, a normally energized relay for the stretch, means for effecting the release of said relay whenever said signal displays a proceed indication and a portion of the stretch to the rear of said signal becomes occupied, means for also effecting the release of said relay whenever any portion of the stretch in advance of said signal is occupied, a track occupied indication signal, means set into operation by the release of said relay to bring about the energization of said indication signal, and means for preventing the energization of said indication signal from occurring while said wayside signal is displaying a proceed indication.

12. In combination, a stretch of railway track, a wayside signal located at an intermediate point along said stretch, a normally energized relay, means for effecting the release of said relay in response to the occupancy of any portion of said stretch or in response to the occupancy of the portion in advance of said wayside signal depending upon whether said signal is displaying a proceed indication or a stop indication, a track occupied indication signal, and means controlled by said relay and by said wayside signal for effecting the energization of said indication signal only when the portion of said stretch in advance of said wayside signal is occupied.

13. In combination, a stretch of railway track, a wayside signal located at an intermediate point along said stretch, a normally energized relay, means for effecting the release of said relay in response to the occupancy of any portion of said stretch providing said signal is displaying a pro-

ceed indication, a track occupied indication signal, means including said relay for effecting the energization of said indication signal when said relay is released, and means for preventing the release of said relay from effecting the energization of said indication signal while said wayside signal is displaying a proceed indication.

14. In combination, a stretch of railway track divided into track sections each equipped with a track circuit including a track relay, a home signal at one end of said stretch, a distant signal at the junction of the first two sections at the other end of said stretch, a traffic control system associated with said stretch and having a control and indication office at a point remote from said stretch; an indication signal at the office for, when energized, indicating that a portion of said stretch between said signals is occupied, an approach relay at one end of said stretch at times under the control of the track relays of sections extending between said signals only and at times also under control of the track relay of the end track section to the rear of said distant signal, a first relay at the office controlled by said approach relay over said traffic control system and operated to effect the energization of said indication signal, a signal repeating relay at the other end of said stretch deenergized whenever said approach relay is under control of the latter track relay, and a second relay at the office controlled by said repeating relay over said traffic control system to prevent the energization of said signal being effected by the operation of said first relay when only said track section to the rear of said distant signal is occupied.

JAMES J. VANHORN.