

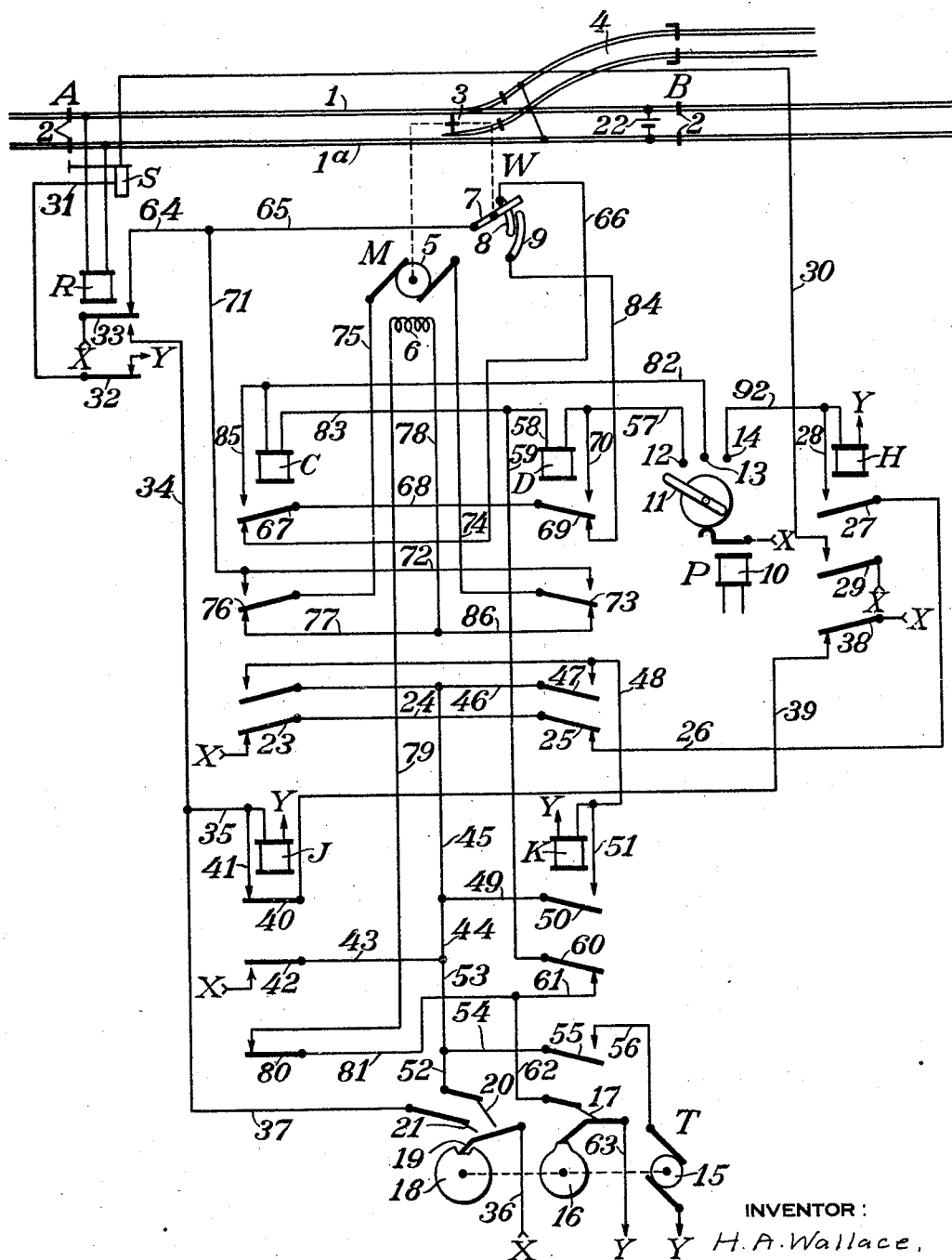
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RAILWAY TRAFFIC CONTROLLING APPARATUS

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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 safely controlling railway traffic governing devices, such for example, as railway switches and signals, from a remote point.

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 illustrating one form of apparatus embodying my invention.

Referring to the drawing, the reference characters 1 and 1^a designate the track rails of a stretch of railway track. These rails are divided, by means of insulated joints 2, to form a track section A—B, containing a switch 3 by means of which the section is connected with a siding 4. Section A—B is provided with a track circuit including a source of current, such as a battery 22, connected across the rails adjacent one end of the section, and a track relay R connected across the rails adjacent the other end of the section. Relay R is, therefore, normally energized, but is de-energized when any portion of section A—B or the siding 4 to the left of point B is occupied by a train.

The switch 3 is controlled by a motor designated by the reference character M and comprising, in the form here shown, an armature 5 and a field 6. The switch 3 in turn controls a circuit controller W comprising a contact 7—9 which is closed at all times except when the switch occupies its normal position, in which it is illustrated in the drawing. The circuit controller W also comprises a contact 7—8 which is closed at all times except when the switch occupies its reverse position.

The motor M is controlled in part by two relays C and D which are in turn controlled by a selector P of any suitable form. As here shown the selector P comprises a member 11 which may be moved into momentary contact with a selected one of contacts 12, 13 or 14. The contact 11 is controlled by a winding 10 which is at times supplied with control codes by means not shown in the drawing and forming no part of the present

invention. In actual practice the selector P would usually be supplied with control codes from a code transmitter, located at a point remote from the switch, such for example, as in an interlocking cabin, and under the control of some operator such as a train despatcher.

Traffic moving from left to right through section A—B is controlled by a trackway signal designated by the reference character S. As here shown this signal is of the two-position semaphore type and is located adjacent point A. Signal S is controlled by a relay H in such manner that the signal indicates proceed when relay H is energized. The circuit for signal S passes from one terminal X of a suitable source of energy not shown in the drawing, through front contact 29 of relay H, wire 30, operating mechanism of signal S, wire 31, and front contact 32 of relay R, to terminal Y of the same source.

The relay H is controlled by selector P, the pick-up circuit for this relay passing from terminal X through contact 11—14 of selector P, wire 92, and winding of relay H, to terminal Y. It will be plain therefore that if selector P is operated to close contact 11—14, relay H becomes energized. This relay is subsequently maintained in its energized condition as long as relays C and D are both de-energized, by virtue of a stick circuit which passes from terminal X through back contact 23 of relay C, wire 24, back contact 25 of relay D, wire 26, front contact 27 of relay H, wire 28, and winding of relay H, to terminal Y.

The reference character J designates a stick relay which is at times controlled in accordance with traffic conditions. As here shown this relay is normally energized over a stick circuit which passes from terminal X over back contact 38 of relay H, wire 39, front contact 40 of relay J, wire 41 and winding of relay J to terminal Y. Associated with relay J is a normally de-energized relay K.

Associated with relays J and K is a timing device which in the form here shown comprises a motor 15 which drives two cams 16 and 18. The cam 16 controls a contact 17 and

cam 18 controls two contacts 19—20 and 19—21. When device T occupies its initial position, in which it is illustrated in the drawing, contact 17 is closed and contacts 19—20 and 19—21 are open. When motor 15 is operated, however, the cams 16 and 18 are rotated, and as soon as this movement of the cams commences contact 17 opens and the contacts controlled by cam 18 close. The cams require a measured interval of time to make one complete revolution and when the cams return to their initial positions contact 17 is again closed and contacts 19—20 and 19—21 re-open.

As shown in the drawing the switch 3 occupies its normal position, and all of the contacts of selector P are open. Relays, C, D, and H are de-energized, relay K is also de-energized, but relay J is energized, its stick circuit being closed at back contact 38 of relay H. The timing device T occupies its initial position so that contact 17 is closed and contacts 19—20 and 19—21 are open. Furthermore relay R is energized and signal S indicates stop. I will now assume that it is desired to move the switch 3 to its reverse position. In order to accomplish this, the selector P is operated to close contact 11—12. Current then flows from terminal X through contact 11—12 of selector P, wire 57, winding of relay D, wires 58 and 59, back contact 60 of relay K, wires 61 and 62, contact 17 of device T, and wire 63 to terminal Y. Relay D therefore becomes energized. The contact of selector P opens after a brief interval, but after relay D has once become energized, a stick circuit, is closed for this relay from terminal X, through front contact 33 of relay R, wires 64 and 65, contact 7—8 of circuit controller W, wire 66, back contact 67 of relay C, wire 68, front contact 69 of relay D, wire 70, winding of relay D, wires 58 and 59, back contact 60 of relay K, wires 61 and 62, contact 17 of device T and wire 63 to terminal Y so that relay D remains closed. A circuit is now closed for motor M from terminal X through front contact 33 of relay R, wire 64, 71, and 72, front contact 73 of relay D, wire 74, armature 5 of motor M, wire 75, back contact 76 of relay C, wires 77 and 78, field 6 of motor M, wire 79, front contact 80 of relay J, wires 81 and 82, contact 17 of device T, and wire 63 to terminal Y. Motor M then operates to drive the switch 3 to its reverse position. When the switch attains this position contact 7—8 opens, thereby interrupting the stick circuit for relay D and allowing this relay to become de-energized. As a result the supply of current to motor M is discontinued.

In similar manner, if it is desired to restore the switch to its normal position, contact 11—13 of selector P is closed. A pick-up circuit for relay C is then completed from terminal X, over contact 11—13 of selector

59, back contact 60 of relay K, wires 61 and 62, contact 17 of device T and wire 63 to terminal Y. As soon as relay C becomes energized a stick circuit is completed for this relay from terminal X through front contact 33 of relay R, wires 64 and 65, contact 7—9 of circuit controller W, wire 84, back contact 69 of relay D, wire 68, front contact 67 of relay C, wire 85, winding of relay C, wires 83 and 59, back contact 60 of relay K, wires 61 and 62, contact 17 of device T and wire 63 to terminal Y. When relay C is energized motor M is supplied with current over a circuit which may be traced from terminal X over front contact 33 of relay R, wires 64 and 71, front contact 76 of relay C, wire 75, armature 5 of motor M, wire 74, back contact 73 of relay D, wires 86 and 78, field 6 of motor M, wire 79, front contact 80 of relay J, wires 81 and 82, contact 17 of device T, and wire 63 to terminal Y. The motor is therefore actuated to drive switch 3 towards its normal position. When the switch has attained its normal position, contact 7—9 opens, thereby deenergizing relay C and discontinuing the supply of current to motor M.

Under some conditions of operation it is desirable, in the interests of safety, to delay, for a time interval, the operation of the switch 3 in response to operation of the selector P. As shown in the drawing, when the selector P is operated to close contact 11—14 relay H picks up to clear signal S, and back contact 38 of relay H is then broken so that the stick circuit for relay J is interrupted, and relay J becomes de-energized. It should be noted, however, that front contact 80 of relay J is included in the operating circuits for motor M and it follows that this motor cannot be operated in either direction unless relay J is energized. In describing the operation of the parts under these conditions I will assume that relay H is energized to clear signal S so that relay J is open, and that it is desired to move the switch from its normal to its reverse position. When contact 11—12 of selector P is closed to pick up relay D, this relay becomes energized, thereby opening, at back contact 25, the stick circuit for relay H. Relay H therefore closes its back contact 38, but relay J remains de-energized. It should be observed that the energization of relay D cannot operate motor M, because the circuit for this motor is now open at front contact 80 of relay J. With relay D energized, however, a circuit is closed for relay K from terminal X, over back contact 42 of relay J, wires 43, 44, 45, and 46, front contact 47 of relay D, wire 48, and winding of relay K to terminal Y. Relay K therefore becomes energized, whereupon a stick circuit is completed for this relay from terminal X, over back contact 42 of relay J, wires 43, 44, and 49, front contact 50 of relay K, wire 51, and

winding of relay K to terminal Y. The energization of relay K opens the stick circuit for relay D at back contact 60 of relay K and relay D therefore opens. The closing of relay K also completes a circuit for motor 15 of timing device T, current flowing from terminal X over back contact 42 of relay J, wires 43, 53, and 54, front contact 55 of relay K, wire 56 and motor 15 to terminal Y. Motor 15 therefore commences to operate, and opens contact 17 and also closes contacts 19—20 and 19—21. The operating circuit for motor M is now open at contact 17 of device T, as well as at front contact of relay J, and it will therefore be plain that the motor cannot be operated to reverse the switch until device T has returned to its normal position.

The closing of contact 19—21 of device T completes a pick-up circuit for relay J from terminal X over wire 36, contact 19—21 of device T, wires 37 and 35, and winding of relay J to terminal Y. As soon as relay J becomes energized, its stick circuit is closed over back contact 38 of relay H now closed. It will be noticed that when back contact 42 of relay J opens the stick circuit previously traced for relay K is interrupted, but this relay is now held closed by an auxiliary stick circuit which passes from terminal X over wire 36, contact 19—20 of device T, wires 52, 53, 44, and 49, front contact 50 of relay K, wire 51, and winding of relay K to terminal Y. The opening of back contact 42 of relay J also interrupted the circuit first traced for motor 15 of device T, but this motor is now energized over a circuit from terminal X through wire 36, contact 19—20 of device T, wires 52 and 54, front contact 55 of relay K, wire 56, motor 15 to terminal Y. The device T therefore continues to operate, and after the expiration of a predetermined time interval the cams 16 and 18 are returned to the positions in which they are shown in the drawing. When this happens contact 19—20 opens, thereby de-energizing relay K and the motor 15 of device T. Furthermore, contact 17 of device T is now closed and since relay J is energized, the motor M may now be energized by again energizing relay D. It will be seen, therefore, that after signal S has once been cleared and returned to its stop position, the switch cannot be reversed in response to operation of selector P until the expiration of the time interval required for operation of the timing device T and that this time interval is measured from the instant P is operated. It will be observed, however, that in addition to the pick-up circuit for relay J, controlled by contact 19—20 of timing device T, this relay is provided with another pick-up circuit which passes from terminal X, over back contact 33 of relay R, wires 34 and 35, and winding of relay J to terminal Y. It will therefore be manifest that if signal S has been cleared by energiza-

tion of relay H, thereby de-energizing relay J, relay J will again be energized by a train passing from left to right through the section A—B. The purpose of this arrangement is to prevent the introduction of the time interval represented by the timing device T in the operation of the switch motor M, in case the signal has been cleared and accepted by a train which passes through the section. If the signal is cleared, and then restored to its stop position without being accepted by a train, the consequent de-energization of relay J requires timing device T to be operated before the switch can be reversed.

In the foregoing explanation I have discussed the operation of the timing device in delaying a switch movement from normal to reverse for a time interval, but with this explanation in mind it will be readily understood from the drawing that the operation of the apparatus for switch movements from reverse to normal will also be delayed in case the signal S has been cleared and restored to its stop position without having been accepted by a train.

In the embodiment of my invention here illustrated relay J is de-energized by closing relay H to clear a signal, but this arrangement is not essential. Relay J may be controlled to open as a result of any other traffic change which would make it desirable to delay the operation of the switch; for example the relay may accomplish approach locking in which case it would be de-energized by a train approaching the switch.

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 railway traffic governing device, a relay, a manually controlled stick circuit for said relay, time measuring means controlled in part by said relay, a pick-up circuit for said stick relay controlled by said time measuring means, and a motor controlled by said relay and by said time measuring means for operating said device.

2. In combination, a railway traffic governing device, a manually controlled relay, a stick relay, a third relay controlled by said stick relay and by said manually controlled relay, time measuring means controlled by said stick relay and by said third relay, a pick-up circuit for said stick relay controlled by said time measuring means, a manually controlled stick circuit for said stick relay, and a motor controlled by said stick relay and

by said time measuring means for operating said device.

3. In combination, a railway switch, a manually controlled selector, a first relay, a second relay controlled at times in accordance with traffic conditions, time measuring means controlled by said second relay, a circuit for said first relay controlled by said selector and by said time measuring means, and a motor controlled by said first relay and by said time measuring means for operating said switch.

4. In combination, a stretch of railway track, a manually controlled selector, a relay controlled in part by traffic conditions in said stretch, a normally closed contact, a motor controlled by said selector and by said relay for at times opening said contact for a measured interval of time, and a traffic governing device in said stretch controlled by said contact and by said selector.

5. In combination, a railway switch, a manually controlled relay, a time measuring device normally occupying an initial position and arranged when operated to return to such position after a measured time interval, means effective if said relay is operated under certain traffic conditions to set said device into operation, and means controlled by said relay for operating said switch provided said device occupies its initial position.

6. In combination, a railway switch, a first relay, a stick relay, a third relay, a time measuring device normally occupying an initial position in which a first contact is closed and a second contact and a third contact are open, means effective when said stick relay is de-energized and said third relay is energized to initiate the operation of said device to open said first relay and close said stick and third relays, means controlled by said second contact and a front contact of said third relay to continue the operation of said device until the device is restored to its initial position, a manually controlled pick-up circuit for said first relay including said first contact and a back contact of said third relay, means responsive to the position of said switch and including said first contact and a back contact of said third relay for subsequently holding said first relay in its energized condition, a pick-up circuit for said stick relay controlled by said third contact, means responsive to traffic conditions adjacent said switch for subsequently holding said stick relay energized, a pick-up circuit for said third relay including a back contact of said stick relay and a front contact of said first relay, a stick circuit for said third relay including said second contact, a motor for operating said switch, and a circuit for said motor controlled by said first relay and including said first contact and a front contact of said stick relay.

7. In combination, a railway track switch,

a signal for governing traffic movements over said switch, a control circuit for said signal, a manually controlled device, a stick relay controlled by said manually controlled device and by said signal control circuit, and means controlled by said relay for controlling said switch.

8. In combination, a railway track switch, a signal for governing traffic movements over said switch, a switch control relay for said switch, a signal control relay for said signal, a stick relay controlled by said switch control relay and by said signal control relay, and means controlled by said stick relay for controlling said switch.

9. In combination, a railway track switch, a signal for governing traffic movements over said switch, a control circuit for said signal, a stick relay, a pick-up circuit for said relay controlled by traffic conditions, a stick circuit for said relay controlled by said signal control circuit, a locking relay controlled by said stick relay and by traffic conditions, and means controlled by said locking relay for controlling said switch.

10. In combination, a railway track switch, a signal for governing traffic movements over said switch, a control circuit for said signal, a locking relay controlled by traffic conditions and by said signal control circuit, a stick relay, a pick-up circuit for said stick relay controlled by traffic conditions, a stick circuit for said stick relay controlled by said locking relay, and means controlled by said stick relay for controlling said switch.

11. In combination with a railway switch, a manually controlled element, a first relay controlled by said element, a second relay, a slow-acting mechanism, means operating if said element is operated when a train is approaching the switch to briefly energize said second relay and said slow acting mechanism, means controlled by said second relay for subsequently supplying energy to said second relay and said slow-acting mechanism, and a motor controlled by said first relay and by said slow-acting mechanism for controlling the switch.

12. In combination with a railway governing device, a manually controlled element, means controlled by said element for operating said device, timing mechanism requiring a definite time interval after actuation to complete its operation, means effective if and only if said element is operated under certain conditions of traffic adjacent said device to actuate said timing mechanism, and means for subsequently preventing operation of said device irrespective of traffic conditions until said mechanism has completed its operation.

13. In combination with a railway switch, a manually controlled signal relay, a railway signal controlled by said signal relay and

governing traffic over said switch, a locking relay controlled by said signal relay, a manually controlled selector, and means controlled by said selector and by said locking relay for operating said switch.

In testimony whereof I affix my signature.

HERBERT A. WALLACE.

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