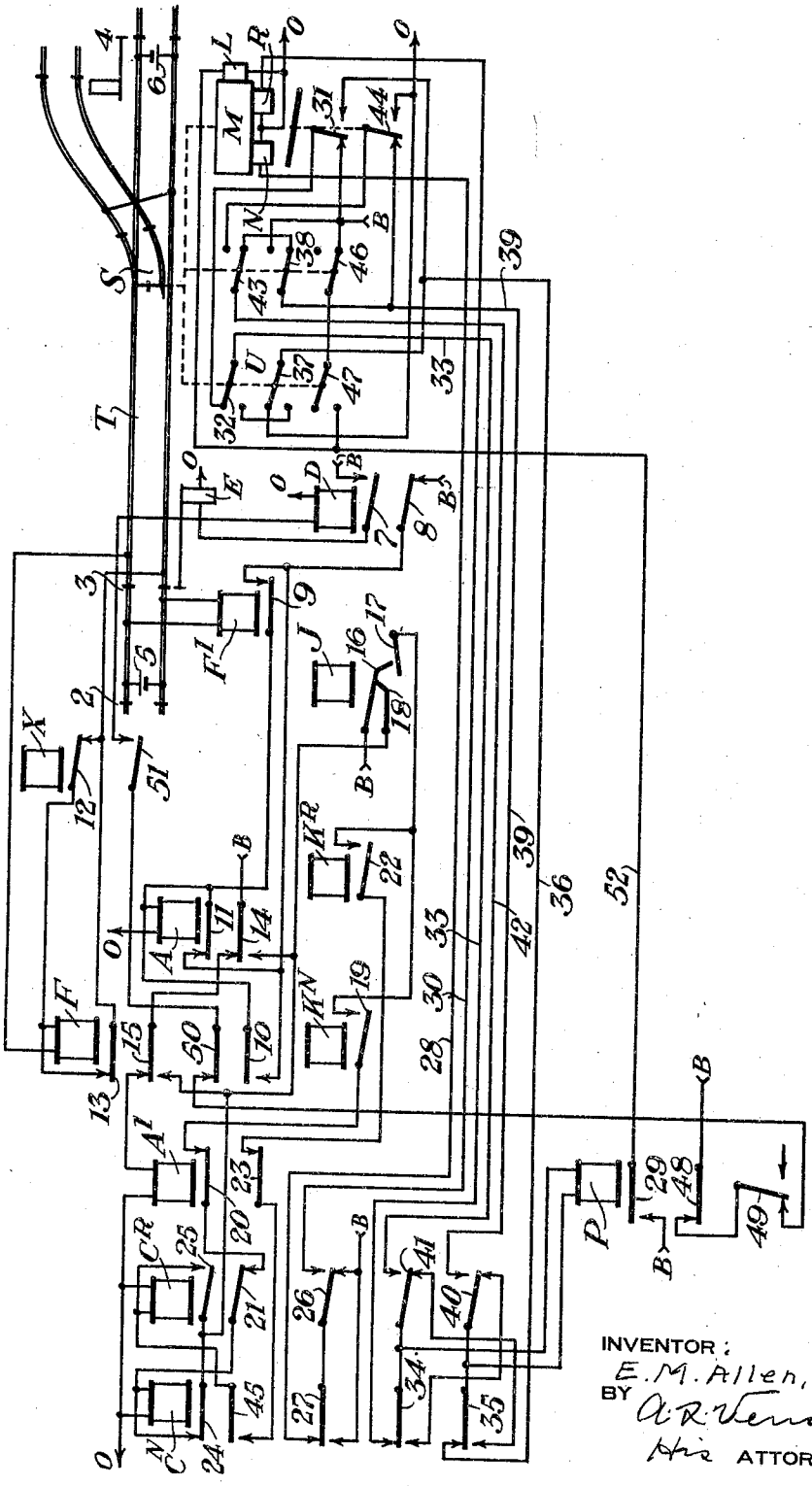
Aug. 25, 1931. E. M. ALLEN 1,820,110

RAILWAY TRAFFIC CONTROLLING APPARATUS

Filed Sept. 10, 1930



Patented Aug. 25, 1931 1,820,110

UNITED STATES PATENT OFFICE

EARL M. ALLEN, OF SWISSVALE, PENNSYLVANIA, ASSIGNOR TO THE UNION SWITCH & SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

RAILWAY TRAFFIC CONTROLLING APPARATUS

Application filed September 10, 1930. Serial No. 480,887.

My invention relates to railway traffic controlling apparatus, and has for an object the provision of novel and improved means for controlling switches and signals from a remote point such as a despatcher's office.

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 T designates a railway track which is divided by the usual insulated joints to form a main track section 3—4 and an approach section 2—3. The main section 3—4 is provided with a switch S, and traffic moving toward the right into this section is governed by a signal E. The switch S is operated by a mechanism M which, as here shown, is of the electropneumatic type, and is therefore provided with a normal magnet N, a reverse magnet R, and a lock magnet L. Associated with the mechanism M and the switch S is a circuit controller U, the contacts of which are operated in the manner hereinafter explained. The signal E is controlled by a signal relay D through the medium of a circuit which includes a front contact 7 of relay D and which circuit will be obvious from the drawing.

The apparatus for the control of the switch S involves a normal control relay C^N, a reverse control relay C^R, an approach locking relay A, and an approach repeater relay A^1. The apparatus also involves a group of relays controlled from a remote point such as a despatcher's office, and this group includes a normal code relay K^N, a reverse code relay K^R, a code operating relay J, and a signal code relay X.

The approach section 2—3 is provided with a track circuit comprising a track battery 5 and a track relay F^1. The main section 3—4 is also provided with a track circuit comprising a battery 6 connected across the rails at one end of the section, and a track relay F connected across the rails at the other end of the section through its own front contact 13. This track circuit is provided with a shunt around front contact 13, which shunt includes a back contact 12 of relay X.

The approach locking relay A is provided with a main pick-up circuit which passes from terminal B of a source of current, through back contact 8 of relay D, front contact 9 of relay F^1, and the winding of relay A to terminal O of the same source. This relay also has a second pick-up circuit which passes from terminal B, through back contact 8 of relay D, back contact 10 of relay F, and the winding of relay A to terminal O. Relay A is provided with a stick circuit which passes from terminal B, through back contact 8 of relay D, contact 11 of relay A, and the winding of relay A to terminal O. It will be noted that all three of the circuits for relay A include back contact 8 of relay D, so that relay A cannot be energized unless relay D is open.

The repeater relay A^1 is provided with a circuit which passes from terminal B, through the front point of contact 14 of relay A, front point of contact 15 of relay F, and the winding of relay A^1 to terminal O.

Relay C^N is provided with a pick-up circuit which passes from terminal B, through front contact 16—17 of relay J, front contact 19 of relay K^N, front contact 20 of relay A^1, back contact 21 of relay C^R, and the winding of relay C^N to terminal O. This relay is provided with a first stick circuit which passes from terminal B, through back contact 16—18 of relay J, front contact 24 of relay C^N, and the winding of this relay to terminal O. Relay C^N has a second stick circuit which is from terminal B, through the back point of contact 14 of relay A, front contact 24 of relay C^N, and the winding of this relay to terminal O. A third stick circuit is provided for relay C^N, which circuit is from terminal B, through the front point of contact 14 of relay A, back point of contact 15 of relay F, front contact 24 of relay C^N, and the winding of this relay to terminal O.

Relay C^R is provided with a pick-up circuit which is from terminal B, through front contact 16—17 of relay J, contact 22 of relay K^R, contact 23 of relay A^1, back contact 45 of

relay C^N, and the winding of relay C^R to terminal O. Relay C^R is provided with three stick circuits which are identical to the three stick circuits hereinbefore traced for relay C^N except that, of course, they include front contact 25 of relay C^R instead of front contact 24 of relay C^N.

The signal relay D is provided with a circuit which passes from terminal B, through other controlling elements which are not shown in the drawing, front contact 48 of relay P, polar contact 49 of relay P in the normal position, front contact 50 of relay F, front contact 51 of relay X, and the winding of relay D to terminal O.

The remaining circuits may best be traced during the explanation of the operation of the apparatus as a whole.

As shown in the drawing, relay C^N is energized by virtue of the stick circuit which includes back contact 16—18 of relay J. Relay A is energized by virtue of its stick circuit being closed at back contact 8 of relay D. Relay A^1 is energized because relay A and relay F are both energized. All of the remotely controlled relays J, K^N, K^R and X are open. The normal magnet N of the switch mechanism M is energized, the circuit being from terminal B, through back contact 26 of relay C^R, front contact 27 of relay C^N, wire 28, and normal magnet N to terminal O. The switch S is, therefore, in its normal position.

Relay P is energized in the normal direction, the circuit being from terminal B, through the normal contact 31 of the switch mechanism M, normal contact 32 of circuit controller U, wire 33, front contact 34 of relay C^N, winding of relay P, front contact 35 of relay C^N, wire 36, and normal contact 37 of circuit controller U to terminal O.

I will now assume that the operator desires to clear signal E to allow a train moving toward the right to pass through the switch S. To do this, he will cause relay X to become energized, thereby closing the circuit hereinbefore traced for relay D, and the closing of relay D will close the circuit for signal E. The closing of relay D will also cause relay A to become deenergized. When the train enters section 3—4, it will open track relay F, thereby opening at contact 50 the circuit for relay D so that signal E will again assume the stop position.

Relay F will not again become energized until the train leaves section 3—4, unless the despatcher releases relay X thereby closing at contact 12 the shunt around contact 13 in the circuit for relay F.

I will now assume that the despatcher desires to reverse switch S. To do this, he will energize relays J and K^R. The energizing of relay J will open the stick circuit for relay C^N at contact 16—18, so that relay C^N will become deenergized. The pick-up circuit for relay C^R will then become closed, and after relay C^R closes, it will be held closed by its stick circuit through contact 16—18 of relay J, which relay will be released as soon as it has performed its functions. The circuit for the normal magnet N of the switch mechanism M will then be opened at contact 27 of relay C^N, and the reverse magnet R will become energized by virtue of a circuit which passes from terminal B, through back contact 27 of relay C^N, front contact 26 of relay C^R, wire 30, and the reverse magnet R to terminal O. Relay P will be deenergized because its normal circuit is interrupted at the front points of contacts 34 and 35 of relay C^N, and, consequently, lock magnet L will be energized by a circuit which passes from terminal B, through back contact 29 of relay P, wire 52, and the lock magnet L to terminal O. Mechanism M will then operate to move the switch S to its reverse position. At the beginning of this operation, the left-hand contacts of circuit controller U will be reversed, whereupon an auxiliary circuit for the lock magnet will be closed, which circuit is from terminal B, through contacts 46 and 47, and the lock magnet L to terminal O. When the operation of the switch is completed, the right-hand contacts of circuit controller U will also be reversed, and contacts 31 and 44 associated with the mechanism M will be swung to the right. Relay P will then be energized in the reverse direction, the circuit being from terminal B, through contact 38, wire 39, front contact 40 of relay C^R, winding of relay P, front contact 41 of relay C^R, wire 42, circuit controller contact 43, and switch mechanism contact 44 to terminal O. It will then be possible for the despatcher to clear another signal governing traffic over the switch S, which signal is not shown in the drawing because it is not essential to a complete disclosure of my invention.

When the despatcher desires to return the switch S to its normal position, he will energize relays J and K^N, thereby again energizing relay C^N. This will energize normal magnet N and lock magnet L so that the parts will be restored to the positions in which they are shown in the drawing.

One feature of my invention is the provision of means for preventing a clear signal indication being taken away by sending out a switch code from the despatcher's office. This is accomplished by the back point of contact 14 of relay A. Assuming that switch S is in the normal position and that the signal code relay X is energized, so that signal E indicates proceed, it will be observed that relay D is energized so that the back contact 8 of this relay is open, and as a result all circuits for relay A are open and the relay is therefore deenergized. If, un-

der these conditions, the despatcher attempts to reverse the switch S by energizing relays J and K^R, the closing of these relays will have no effect because relay C^N will remain energized due to its stick circuit through the back point of contact 14 of relay A. The pick-up circuit for relay C^R will therefore remain open at back contact 45 of relay C^N as well as at contact 23 of relay A^1, and, consequently, the switch S will remain in its normal position. Furthermore, since relay C^N remains energized, relay P will remain energized thereby retaining the circuit for signal relay D in its energized condition. In this way, the operation of the switch control code relays, while signal E is indicating proceed, will not cause this signal to change to the stop indication.

Another feature of my invention is the control of the polarized indication relay P by the controlling relays C^N and C^R as well as by the circuit controller U and contacts 31 and 34 of the switch mechanism M. By virtue of these circuits for relay P, I assure that this relay will always follow the operations of the controlling levers for the code relays J, K^N and K^R.

Apparatus embodying my invention is protected against improper operation due to momentary opening of the track relay F by a momentary break in, or a momentary shunt of, its track circuit. This protection is accomplished by the stick circuit for relay F. In order to cause signal E to indicate proceed, the despatcher will energize the code relay X, which relay will then be retained in the energized condition as long as the despatcher desires to have signal E indicate proceed. Relay X is not controlled by the track circuit for section 3—4, and, consequently, this relay will continue to be energized after the track relay F becomes deenergized. Relay F cannot again become energized until a stop signal code is sent out to deenergize relay X which, by its back contact 12, will then complete the pick-up circuit for track relay F, if the section 3—4 is unoccupied. Momentary deenergization of track relay F will cause relay D to become deenergized, and relay A will then become energized by its pick-up circuit through back contact 8 of relay D and front contact 9 of relay F^1. Relay F will, however, not again become energized until a stop code is sent out to deenergize relay X. Relay A^1 will remain de-energized because its circuit is open at front contact 15 of relay F, and, consequently, the pick-up circuits for both relays C^N and C^R will be open at contacts 20 and 23 of relay A^1, making it impossible to energize either of the control relays. Furthermore, the stick circuit for one or the other of these relays will continue to be energized through the front point of contact 14 of relay A and the back point of contact 15 of relay F.

Apparatus embodying my invention is also protected against improper operation due to failure of a train occupying section 3—4 to effectively shunt track relay F. Assuming that the train occupies section 3—4 and that relay X is still energized, it is obvious that a momentary failure of a train to shunt relay F will not permit this relay to become energized because its pick-up circuit will be opened at back contact 12 of relay X and also because its stick circuit will be opened at contact 13 of relay F.

Another feature of my invention is that when both relays C^N and C^R are deenergized, relay P is placed on short circuit so that, under this condition, there is no possibility of relay P becoming falsely energized by current of either polarity. The short-circuiting of relay P is accomplished by two multiple paths, one of which is from the left-hand terminal of this relay through back contact 35 and back contact 41 to the right-hand terminal; and the other of which is from the left-hand terminal through back contact 40 and back contact 34 to the right-hand terminal.

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 containing a switch, a track circuit for said section including a source of current connected across the rails at one end of the section and a track relay connected across the rails at the other end through its own front contact, a signal governing traffic over said switch, a remotely controlled relay for governing said signal, a shunt around said track relay front contact in said track circuit including a back contact of said remotely controlled relay, and means for controlling said switch by said track relay.

2. In combination, a section of railway track, a track circuit for said section including a source of current connected across the rails at one end of the section and a track relay connected across the rails at the other end through its own front contact, a signal for said section, a remotely controlled relay for governing said signal, and a shunt around said track relay front contact in said track circuit including a back contact of said remotely controlled relay.

3. In combination, a railway switch, a normal control relay and a reverse control relay for governing said switch, means controlled from a remote point for energizing

either of said relays at will provided the other relay is deenergized, a signal governing traffic over said switch, a signal relay for controlling said signal, an approach locking relay controlled in part by a back contact of said signal relay, and a stick circuit for each of said switch control relays including a back contact of said approach locking relay, whereby when said signal indicates proceed an attempted operation of said switch will not be successful and will not result in changing the indication given by the signal.

4. In combination, a section of railway track containing a switch, a signal governing traffic over said switch, a normal switch control relay C^N and a reverse switch control relay C^R for governing said switch, an approach locking relay A, an approach locking repeater relay A^1, a signal relay D, a polarized indication relay P; a group of relays controlled from a remote point and including a normal switch relay K^N, a reverse switch relay K^R, a code operating relay J, and a signal code relay X; a track circuit for said section including a source of current connected across the rails at one end and a track relay connected across the rails at the other end through its own front contact, a shunt around said track relay front contact including a back contact of relay X, an approach track section provided with a track relay F^1; means for energizing approach locking relay A when relay D is open and relay F^1 is closed, or when relays D and F are both open, means for subsequently keeping relay A energized while relay D is open, means for energizing relay P while relays A and F are both closed; means for energizing relay C^N while relays J, K^N and P are closed and relay C^R is open; means for keeping relay C^N energized while relay A is open, or while relay A is closed and relay F is open, or while relay J is open; means for energizing relay C^R while relays J, K^R and P are closed and relay C^N is open; means for keeping relay C^R energized while relay A is open, or while relay A is closed and relay F is open, or while relay J is open; means for energizing relay P in normal or reverse direction when relay C^N is closed and said switch is in normal position, and means for energizing signal relay D when relays X and F are energized and relay P is energized in normal direction.

In testimony whereof I affix my signature.

EARL M. ALLEN.