D. J. McCARTHY.

AUTOMATIC SIGNALING SYSTEM.

APPLICATION FILED MAR. 5, 1910.

1,008,172. Patented Nov. 7, 1911.

3 SHEETS—SHEET 1.

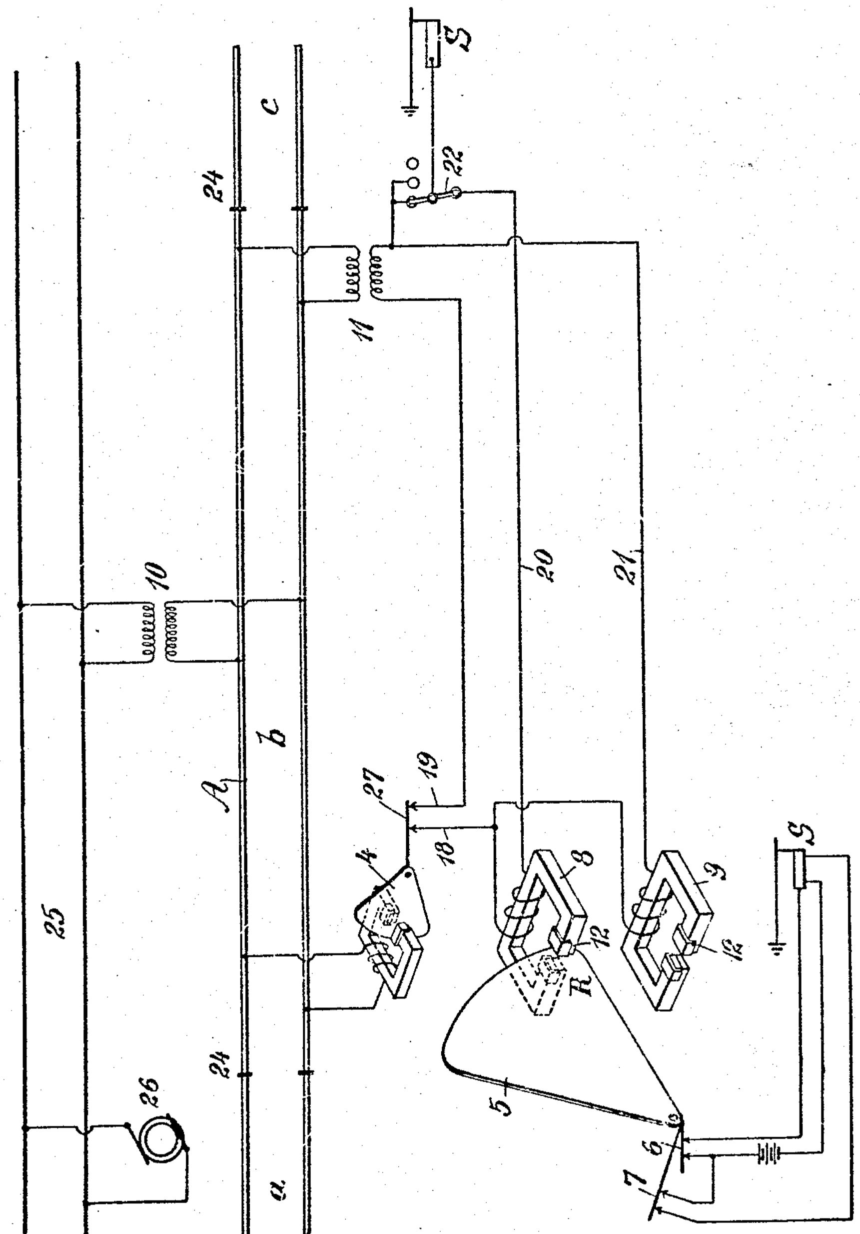

Fig. 1,

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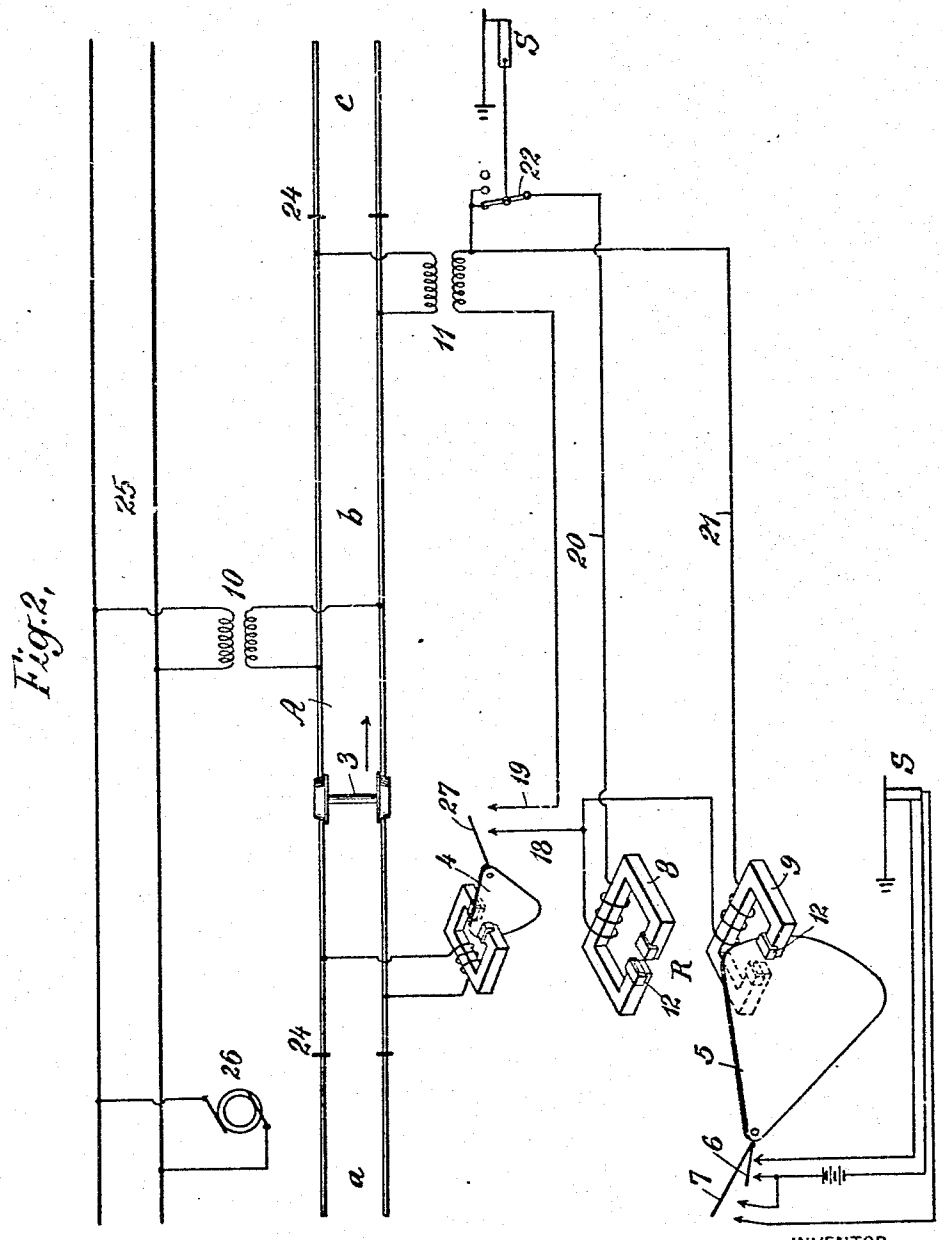
3 SHEETS—SHEET 2.

Fig. 2.



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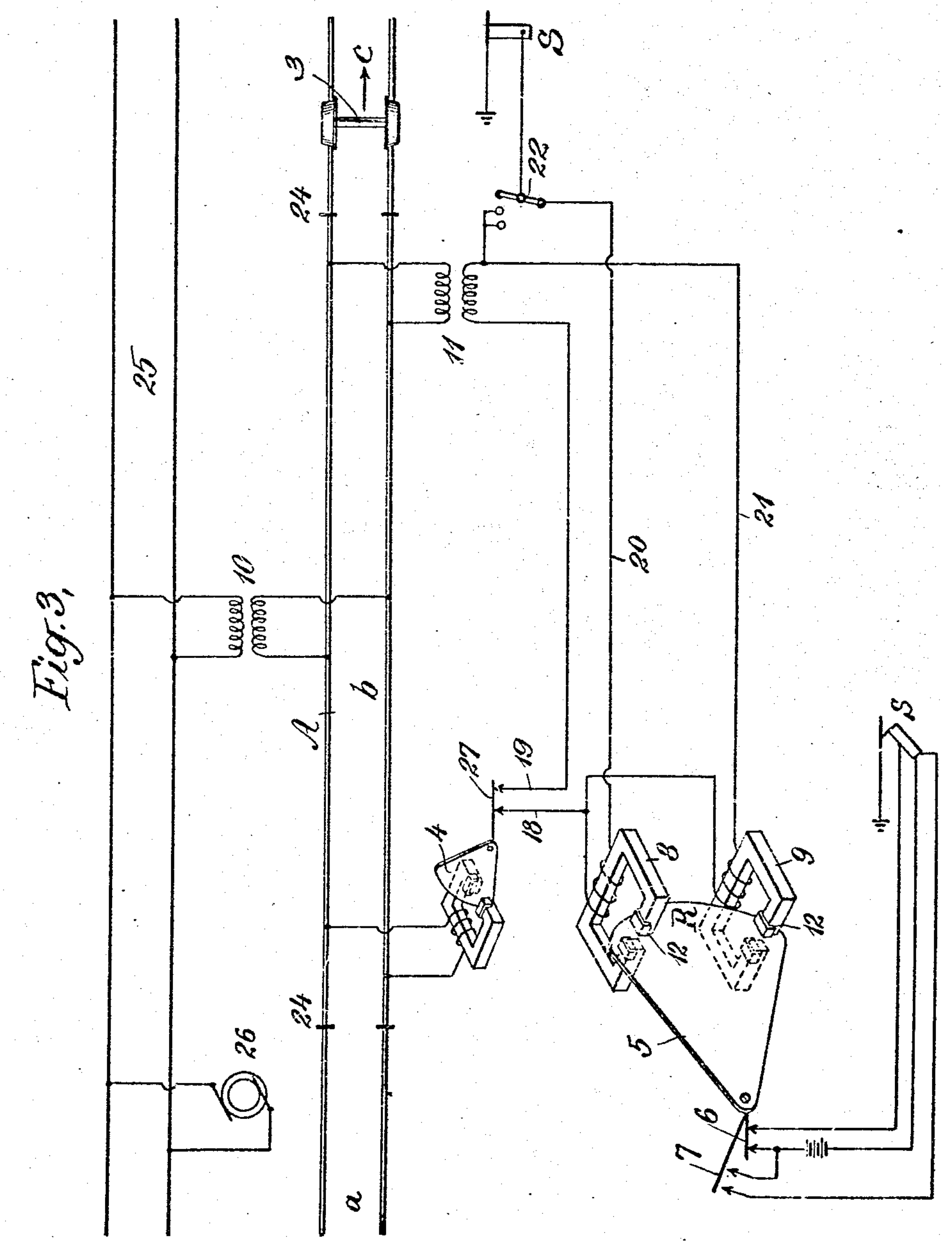
3 SHEETS—SHEET 3.



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AUTOMATIC SIGNALING SYSTEM.

1,008,172. Specification of Letters Patent. Patented Nov. 7, 1911.

Application filed March 5, 1910. Serial No. 547,591.

To all whom it may concern:

Be it known that I, DANIEL J. McCARTHY, a citizen of the United States, residing in the borough of Wilkinsburg, county of Allegheny, State of Pennsylvania, have invented certain new and useful Improvements in Automatic Signaling Systems, of which the following is a specification.

My invention relates to automatic signaling systems employing alternating current in the track circuits, and provides an efficient, economical and simple system for the control of three-position signals or of home and distant signals.

I will describe a signaling system embodying my invention, and will then point out the novel features in claims.

In the accompanying drawings, Figure 1 is a diagrammatical view of a signaling system embodying my invention. Figs. 2 and 3 are views similar to Fig. 1 but showing the signals and relays in the positions they assume when affected by the presence of a train.

Similar reference characters refer to similar parts throughout the several views.

Referring now to the drawings, the reference character A designates a portion of a railway track which may be divided into block sections *a*, *b* and *c* in any suitable manner as for example by means of insulation 24 at suitable points in the rails. For each block section I provide a track circuit which includes the rails or portions of the rails of such block section.

26 designates a source of alternating signaling current connected with mains 25 from which alternating current is supplied to the track circuit of each block section in any suitable manner, as by means of transformers 10 having their primaries connected with the mains 25 and their secondaries connected with the track rails at or near the middle of the block section.

A relay 4, responsive only to alternating current, of which several types are well known in the art, has its energizing coils connected across the track rails near one end of each block section. The armature of this relay operates a circuit controller 27. Across the rails near the opposite end of the block section is connected the primary winding of a transformer 11.

For each block section I provide a relay R, comprising a movable armature or vane 5 which moves between the pole pieces of two separate magnetic cores 8 and 9, and operates two circuit controlling contacts 6 and 7. Each of these magnetic cores is of a type constructed as set forth in Letters Patent No. 823,086 granted on June 12, 1906, to L. H. Thullen. The shading bands 12 or metallic bands of high electrical conductivity are so arranged as to give the armature a tendency toward upward movement when the magnetic cores are energized by alternating current. When both magnetic cores are deënergized, the armature will by gravity take the position shown in Fig. 2, when it will be out of the influence of the core 8 but within that of core 9. Both contacts 6 and 7 controlled by armature 5 will then be open. When core 9 is energized by alternating current in its winding, the armature will rotate in the upward direction until it has traveled its full stroke in core 9, assuming the position shown in Fig. 3. In this position contact 6 will be closed and contact 7 open. The upper part of the armature is now within the influence of core 8, and if this core be now energized the armature will be further rotated upward to the position shown in Fig. 1, when both contacts 6 and 7 will be closed.

The energizing windings for the cores 8 and 9 are connected with the secondary of the transformer 11 by wires 19, 20 and 21 as shown in the figures.

At the entrance to each block section I provide a signal S, the operating circuits for which are controlled by the contacts 6 and 7 of relay R. These signals may be of any type adapted to give "home" and "distant" indications; as here shown they are of the one-arm three-position type. The control of each signal by its relay R is essentially the same regardless of the type of signal. At each signal I place a circuit controller 22 operated by the movement of the signal blade in the well-known manner. This circuit controller governs the energizing circuits for the relay R of the preceding block as hereinafter described.

The operation of the system is as follows: Referring first to Fig. 2, it will be seen that the rails of the block section *b* are short-circuited by the wheels and axles of a car 3, and that the relay 4 is therefore deënergized. The contact 27 of this relay being open, all current is cut off of the relay R, whose arma-

ture 5 is therefore in its downward position, holding open both contacts 6 and 7 and therefore holding the signal S in the danger position. As the car moves in the direction of the arrow and passes the middle of the block *b*, the relay 4 may become energized to close its contact 27, but signaling current will still be cut off from relay R owing to the transformer 11 being now shortcircuited by the car. As the car 3 passes into block-section *c*, the signal S for that block will be moved to danger position as heretofore described for the signal of block *b*, and the circuit controller 22 will thereby be moved to the open position as shown in Fig. 3. Relay 4 having been energized by the car 3 moving out of the block *b*, a circuit is closed through the winding on magnetic core 9 of relay R as follows: transformer 11, wire 19, contact 27, wire 18, winding on core 9, wire 21, to transformer 11. The armature 5 will now move to its middle position, closing contact 6 and thereby moving the signal S to its caution position. Upon the car 3 leaving block *c*, the signal S for that block will move to its caution or clear position, either of which movements closes the contacts of the circuit controller 22. A circuit will then be closed through the winding on core 8 as follows: transformer 11, wire 19, contact 27, wire 18, winding on core 8, wire 20, contact 22 to transformer 11. The armature 5 being then rotated to its uppermost position, contacts 6 and 7 will both be closed, and the signal S will therefore move to its clear position.

It will be seen from the foregoing description that by the use of a system embodying my invention, the control of three-position signals, and of home and distant signals may be effected by the use of but one signal relay, which relay is of simple and more economical construction than has been heretofore used for this purpose.

Although I have shown the source of signaling current located near the middle of each block section, and an auxiliary relay 4 at one end, I do not wish to be limited to this specific arrangement of track circuit, for this arrangement may be widely departed from according to the conditions of each installation without departing from the spirit and scope of my invenion.

Having thus described my invtntion, what I claim is:

1. In a railway signaling system, a track circuit, a source of alternating signaling current therefor; a relay comprising an armature biased to one controlling position, a magnetic core adapted when energized by flux produced by alternating current to move the armature to another controlling position, a second magnetic core adapted when energized by flux produced by alternating current to move the armature to a third controlling position, a winding for each of said magnetic cores, means for supplying alternating signaling current to each of the said windings from the said track circuit, and separate and independent means for controlling the supply of said alternating signaling current to one of the said windings.

2. In a railway signaling system, a plurality of track circuits, a source of alternating signaling current for each track circuit; a relay for each track circuit comprising an armature biased to one controlling position, a magnetic core adapted when energized by flux produced by alternating current to move the armature to another controlling position, a second magnetic core adapted when energized by flux produced by alternating current to move the armature to a third controlling position, a winding for each of said magnetic cores, means for supplying alternating signaling current to each of said windings from the track circuit for which the relay is provided, the supply of said alternating signaling current to each winding being controlled by the condition of the said track circuit, and means governed by the condition of the next succeeding track circuit for independently controlling the supply of alternating signaling current to one of the said windings.

3. In a railway signaling system, a plurality of track circuits, a source of alternating signaling current for each track circuit; a relay for each track circuit comprising an armature biased to one controlling position, a magnetic core adapted when energized by flux produced by alternating current to move the armature to another controlling position, a second magnetic core adapted when energized by flux produced by alternating current to move the armature to a third controlling position, a winding for each of said magnetic cores, means for supplying alternating signaling current to each of the said windings from the track circuit for which the relay is provided, the supply of such alternating signaling current to each of said windings being affected by the presence or absence of a car or train on said track circuit, and means for affecting the supply of such alternating signaling current to one of the said windings by the presence or absence of a car or train on the next succeeding track circuit.

4. In a railway signaling system, a plurality of track circuits, a source of alternating signaling current for each track circuit, a railway signal for each track circuit, controlling circuits for each signal; a relay for each track circuit comprising an armature biased to one controlling position, a magnetic core adapted when energized by flux produced by alternating current to move the armature to another controlling position, a second magnetic core adapted when ener-

gized by flux produced by alternating current to move the armature to a third controlling position, contacts operated by the said armature for controlling the circuits for the signal for the corresponding track circuit, a winding for each magnetic core; means for supplying alternating signaling current to each winding from the track circuit for which the relay is provided, the supply of said alternating signaling current to each winding being controlled by the condition of the said track circuit, and means governed by the condition of the next succeeding track circuit, for independently controlling the supply of said alternating signaling current to one of said windings.

5. In a railway signaling system, a plurality of track circuits, a source of alternating signaling current for each track circuit, a railway signal for each track circuit, controlling circuits for each signal; a relay for each track circuit comprising an armature biased to one controlling position, a magnetic core adapted when energized by flux produced by alternating current to move the armature to another controlling position, a second magnetic core adapted when energized by flux produced by alternating current to move the armature to a third controlling position, contacts operated by said armature for controlling the circuits for the signal for the corresponding track circuit, a winding for each magnetic core, each of which windings is connected with the track circuit for which the relay is provided, and means operatively connected with the railway signal for the next succeeding track circuit for independently controlling the supply of alternating signaling current to one of said windings.

In testimony whereof, I have hereunto signed my name to this specification, in the presence of two subscribed witnesses.

DANIEL J. McCARTHY.

Witnesses:
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M. S. KIRKLAND.