D. J. McCARTHY.

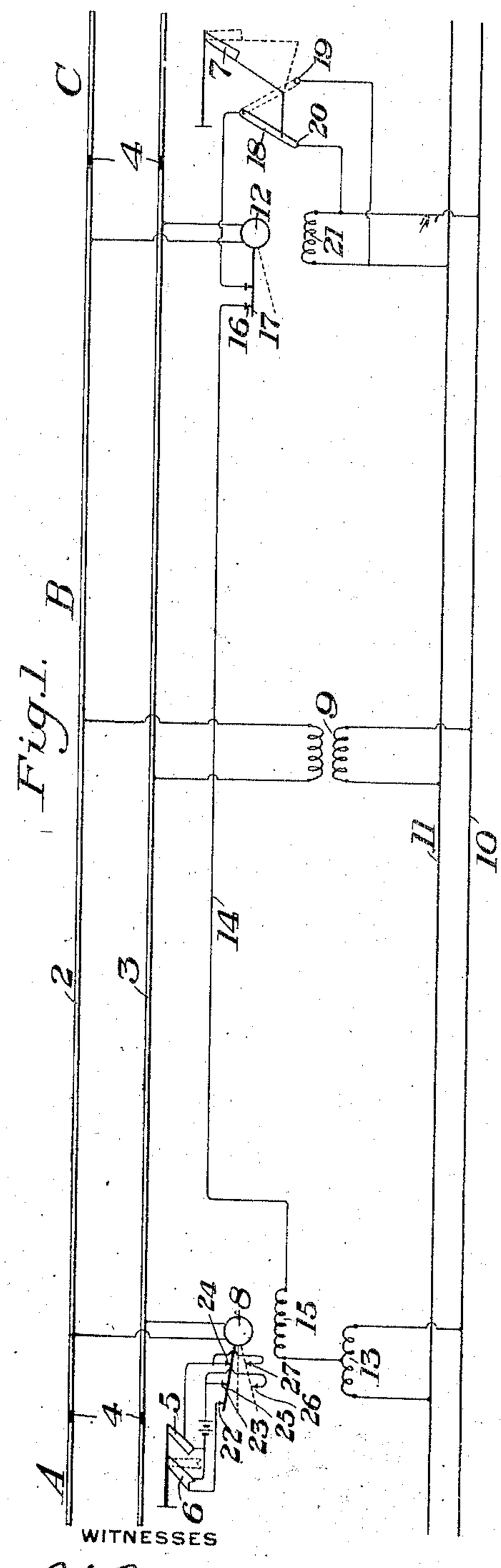
BLOCK SIGNALING SYSTEM.

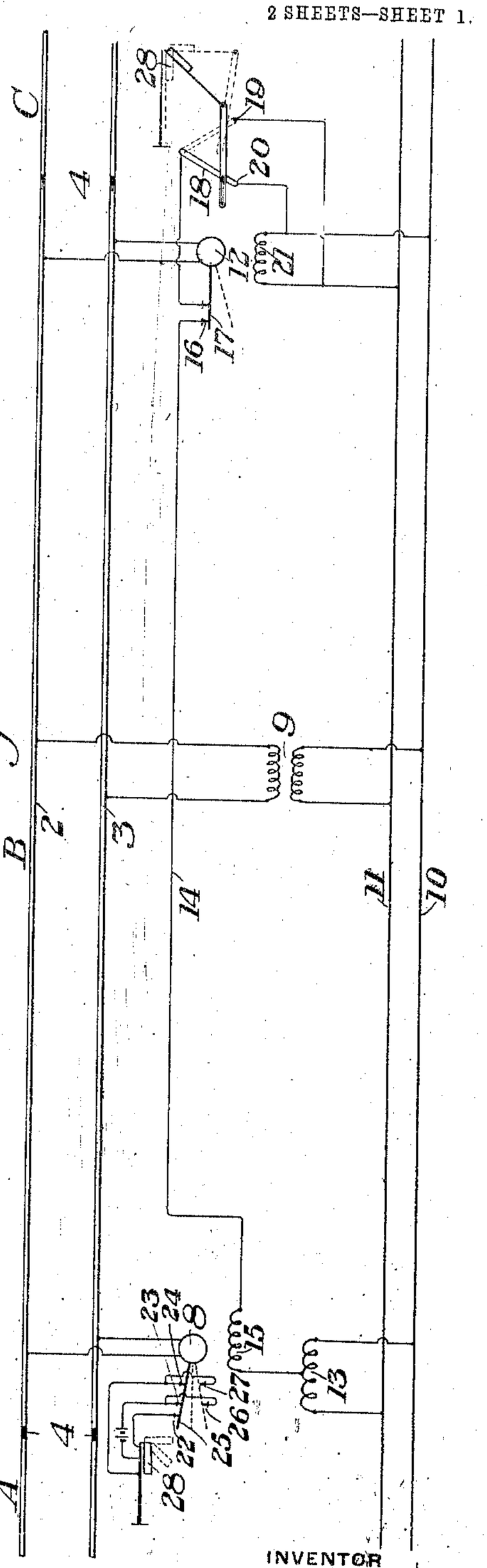
APPLICATION FILED JAN. 29, 1909.

928,396.

Patented July 20, 1909.

2 SHEETS—SHEET 1.





WITNESSES

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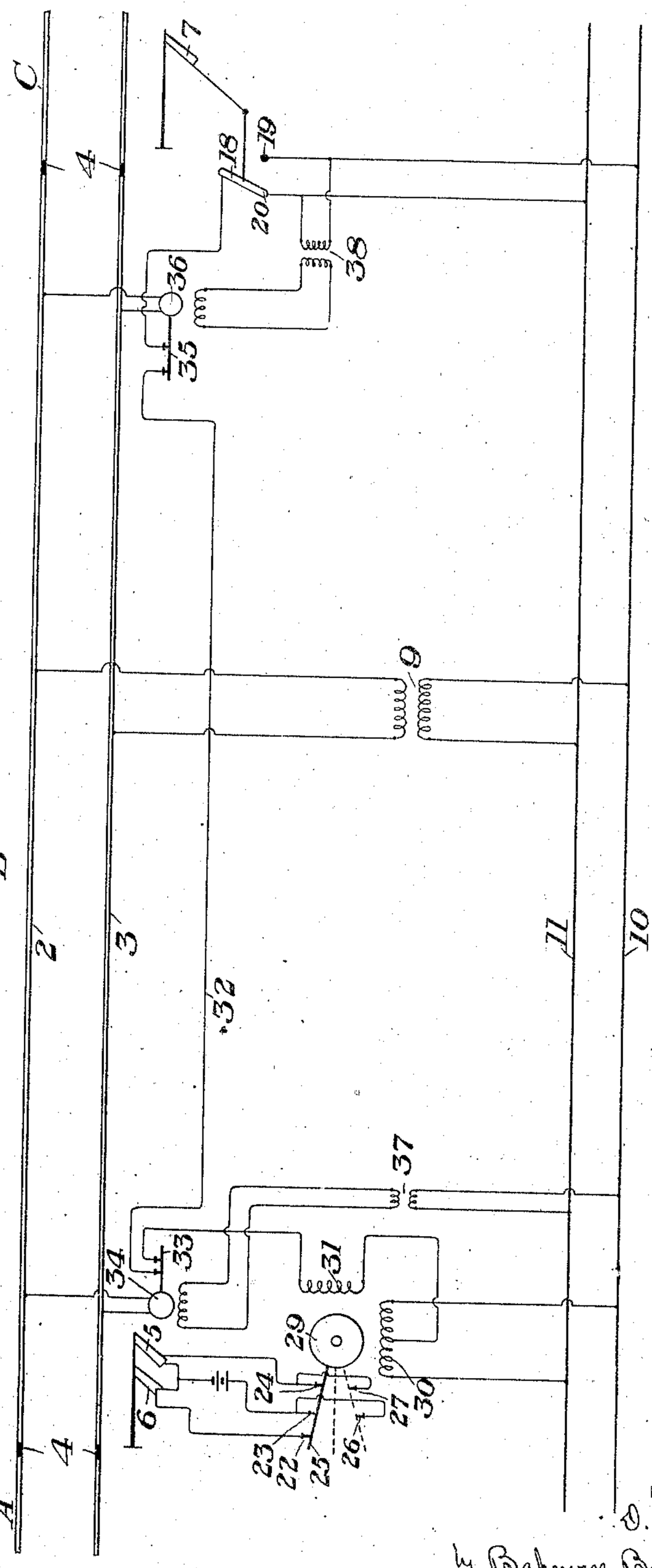

Fig. 3.

WITNESSES

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UNITED STATES PATENT OFFICE.

DANIEL J. McCARTHY, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO THE UNION SWITCH & SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

BLOCK-SIGNALING SYSTEM.

No. 928,396. Specification of Letters Patent. Patented July 20, 1909.

Application filed January 29, 1909. Serial No. 474,937.

To all whom it may concern:

Be it known that I, DANIEL J. McCARTHY, of Wilkinsburg, Allegheny county, Pennsylvania, have invented a new and useful Improvement in Block-Signaling Systems, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figures 1, 2 and 3 are diagrammatic views illustrating different embodiments of my invention.

My invention has relation to block-signaling apparatus, more particularly to a signaling system employing home and distant or three-position signals. In this class of block signals where the distant signal arm or the clear position of the three-position signal is controlled by the movement of the home signal for the block in advance, it has been customary to effect this control, when alternating current is used in the track circuits and the transformer is placed at the entering end of the block, by a reversal of the polarity of the track circuit through pole-changing devices operated by the home signal in advance. When, however, the transformers, which supply signaling currents to the respective blocks, are placed at the central portions of the blocks, this method can not be employed.

The present invention is designed to provide a simple and efficient method of controlling distant signals or the clear position of three-position signals when the transformer is placed at the central portion of the block.

A further object is to provide a signaling system of this character in which the circuits are simplified and a saving is effected in the amount of line wire and relays required for the operation.

The nature of my invention will be best understood from the accompanying drawings, in which I have shown three embodiments thereof and which will now be described, it being premised, however, that various changes may be made in the details of construction and arrangement of the various parts by those skilled in the art, without departing from the spirit and scope of my invention as defined in the appended claims.

Referring to Fig. 1, the numerals 2 and 3 designate the track rails which are divided into the block sections A, B and C by the insulated joints 4. 5 designates the home signal guarding the entrance to the block B, and 6 is the corresponding distant signal for indicating the condition in the advance block section C. 7 is the home signal guarding the entrance to the block C. It will, of course, be understood that the block C is also provided with both home and distant signals, but the distant signal for this block is omitted in the drawings for the purpose of simplification. 8 designates a three-position relay having one of its elements, in this case, the rotor or armature element, connected across the track rails 2 and 3 at a point near the entrance of the block B. 9 is a transformer having its primary connected across the signal supply mains 10 and 11, and its secondary connected across the track rails 2 and 3 at the central portion of the block B. 12 is a relay having one element, in this case, its rotor or armature element, connected across the track rails 2 and 3 at a point near the leaving end of the block B. 13 is an impedance coil which is connected across the signal mains 10 and 11. Connected to the central portion of the impedance coil 13 is a conductor 14 which includes a coil or winding 15, forming the other element of the relay 8, the conductor extending to the other end of the block and passing through contacts 16, controlled by the movable arm 17 of the relay 12. The distant end of the conductor 14 is connected to the movable arm 18 of a two-position switch, which is connected by a suitable connection with the signal 7. The two stationary contacts 19 and 20 of the two-position switch 18 are respectively connected to opposite sides of the signal mains 10 and 11, as shown, a coil 21, also connected across said mains, forming the other element of the relay 12. The relay 8 is provided with the front contacts 22, 23, and 24, for engagement with the movable arm 25 of the relay 8, and with the back contacts 26 and 27, which are also engaged by said arm in its other position. These front and back contacts are connected with the actuating mechanism of the signal blades 5 and 6. In the position of the arm 25, shown in full lines in Fig. 1, the circuits of the actuating mechanisms of both blades are closed and both blades are in their clear positions. In the intermediate dotted position of the arm 25, the circuits of the actuating mechanisms of both these blades are

opened and both blades are in their danger positions, this dotted position being the de-energized position of the relay. In the third position of the arm 25, the circuit of the actuating mechanism for the home signal arm 5 is closed and that signal is cleared, while the circuit for the actuating mechanism of distant signal 6 is opened and the signal 6 remains at danger.

Assuming that at any instant current is flowing from the line wire 10 to the line wire 11, it will be seen that current will be flowing in the conductor 14 from the two-position or reversing switch 18, toward the relay 8, and through the coil or winding 15 of that relay to the middle point of the impedance coil 13, and thence through one-half of that coil to the line wire or signal main 11. This holds the relay 8 in the position shown in full lines in Fig. 1, with both signals 5 and 6 cleared. When, however, the signal blade 7 moves to danger position, the arm 18 is shifted from the contact 20 to the contact 19, thereby shifting the connection of the distant end of the conductor 14 from the line wire 10 to the line wire 11. Current now flows through the other half of the impedance coil and through the conductor 14 in the reverse direction. This reverses the position of the relay 8 and moves its arm 25 into engagement with the back contacts 26 and 27.

It will be seen that as soon as the train enters the left hand end of the block section B, the relay 8 will be short-circuited and moved to its intermediate position, thereby opening the circuit of the actuating mechanisms of both signal blades 5 and 6, and setting both these blades at danger. The relay 8 remains short-circuited until the train has passed beyond the transformer 9, when the relay 17, is, in turn short-circuited, thus keeping the circuit of the coil 15 open and holding the relay 8 in its middle or de-energized position. As soon as the train passes out of block B into the block C, relay 17 again closes and completes the circuit of the coil 15. As soon, however, as the train enters the block section C, the signal blade 7 is moved to danger position, and thereby shifts the switch 18, to reverse the direction of current flowing in the coil 15. This reverses the relay 8 to clear the home signal 5 and to hold the distant signal 6 at danger. When the home signal 7 clears, the current in coil 15 is again reversed and the distant signal 6 is cleared.

The system shown in Fig. 2 is the same in all respects as that shown in Fig. 1, except that instead of employing home and distant signal blades, a single three-position blade is employed at the entrance to each block. The three positions of these blades are indicated in dotted lines. The other parts being the same as in Fig. 1, are given the same reference characters as in that figure. It will be readily seen that the movements of the relays 8 are controlled in the same manner as in Fig. 1, and that these movements control the three positions of the blades 28.

In the arrangement shown in Fig. 3, 29 is a three-position relay which corresponds to the relay 8 of Figs. 1 and 2, and which controls the home and distant signal blades at the entrance to block B. In this figure, however, this relay has one winding 30, which is connected across the signal mains 10 and 11, and another winding 31, which is connected at one end to the middle point of the winding 30 and at its other end to a conductor 32, which corresponds to the conductor 14 of Figs. 1 and 2. This conductor and also through the contacts 35 of a track relay 34, at the entrance end of the block B and also through the contacts 35 of a track relay 36, connected across the rails at the leaving end of the block B, the contacts 33, 35 being in series. The relay 29 is preferably of the split-phase induction motor type in which it is necessary that the current in one of the windings be out of phase with that in the other winding, this being accomplished by the connection of the winding 31 to the middle point of the winding 30, and the coils being so designed as to give the necessary different phase relations. It will be apparent that the reversal of current in either of the windings 30 or 31 will cause a reversal in the direction of rotation of the armature 9 of the relay. The track relays 35 and 36 may be of any suitable character. In the drawings I have shown them each as having one element connected across the track rails and a second element supplied with current by secondaries of the transformers 37 and 38, these transformers being connected across the signal mains 10 and 11. The other parts of Fig. 3, which correspond to similar parts in Figs. 1 and 2, are given similar reference characters to those in Figs. 1 and 2. The operation of this is substantially the same as that of the system shown in Fig. 1, as the shifting of the switch arm 18 by the movement of the home signal 7 will reverse the current in the windings 30 and 31 of the relay 29, to thereby reverse the relay. The object of using the relay 29 is to keep the high voltage of the line of the signal mains 10 and 11 out of the windings of the track relay 34, when this voltage is high enough to be objectionable for use in the relay of the type shown. The relays 34 and 36 may be of the vane type with but one actuating element and that connected directly across the track rails. The signaling mains 10 and 11 may be supplied with alternating current from any suitable source, not shown.

It will be noted that in both forms of my invention, I provide for the clearing of the

distant signal by the use of a single conductor extending back from the signal in advance, thus greatly reducing the amount of wire which is required, as well as simplifying the system as a whole.

I claim:

1. In a block signaling system, signaling means for indicating the condition of two successive blocks, a three-position relay for controlling the signaling means, a source of supply for signaling current connected to each block at the central portion thereof, a single conductor connected to the said source of supply at both ends of the block and having means for controlling the position of the relay, and means controlled by the movement of the advance home signal for reversing the current in said conductor to thereby reverse the relay, substantially as described.

2. In a block signaling system, sectional track rails forming block sections, signaling means for indicating the condition of two adjacent sections, a three-position relay for controlling the signaling means located at the entrance end of the block, a track relay connected across the opposite end portion of the block section, said three-position relay having an energizing element, the opposite terminals of said element being connected to signal mains at opposite ends of the block by a conductor controlled by the track relay, and means controlled by the advance home signal for reversing the direction of current through the energizing element, substantially as described.

3. In a block signaling system, a track divided into block sections, signal means for indicating the condition of two adjacent block sections, a three-position relay for controlling the signal means, supply lines or mains for signaling current connected to the middle portion of each block, an impedance coil connected across said mains, a conductor connected to the intermediate portion of the impedance coil and including a winding constituting an energizing element for the relay, a track relay at the opposite end portions of the block, a conductor connected to the energizing element, and passing through contacts controlled by the track relay, and a reversing switch operated by the advance home signal and arranged to connect the distant end of said conductor with either one of the signal mains, substantially as described.

4. In a block signaling system, a track rail divided into block sections, signaling current lines or mains having a supply connection with each block section at the intermediate portion thereof, signal means for indicating the condition of two adjacent blocks, a three-position relay for controlling the signal means, a coil connected across the signal mains at one end of the block, a conductor leading from the intermediate portion of said coil to the opposite end of the block, a track relay at the opposite end of the block having contacts controlling said conductor, and a shifting switch controlled by the advance home signal for connecting said conductor to either one of the signal mains, said coil forming a means for controlling the action of the three-position relay, substantially as described.

5. In a block signal system, a three-position relay for controlling the signals, current supply mains, a coil connected across said mains at one end portion of the block, and arranged to control the position of the relay, a conductor leading from the central portion of the coil to the opposite end of the block, and means controlled by the passage of a train out of the advance block for reversing the current in said conductor, substantially as described.

In testimony whereot, I have hereunto set my hand.

DANIEL J. McCARTHY.

Witnesses:

GEO. B. BLEMING,

GEO. H. PARMELEE.