No. 898,324. PATENTED SEPT. 8, 1908.

E. R. COE.

ELECTRIC SIGNALING SYSTEM.

APPLICATION FILED MAY 11, 1908.

2 SHEETS—SHEET 1.

Fig. 1.

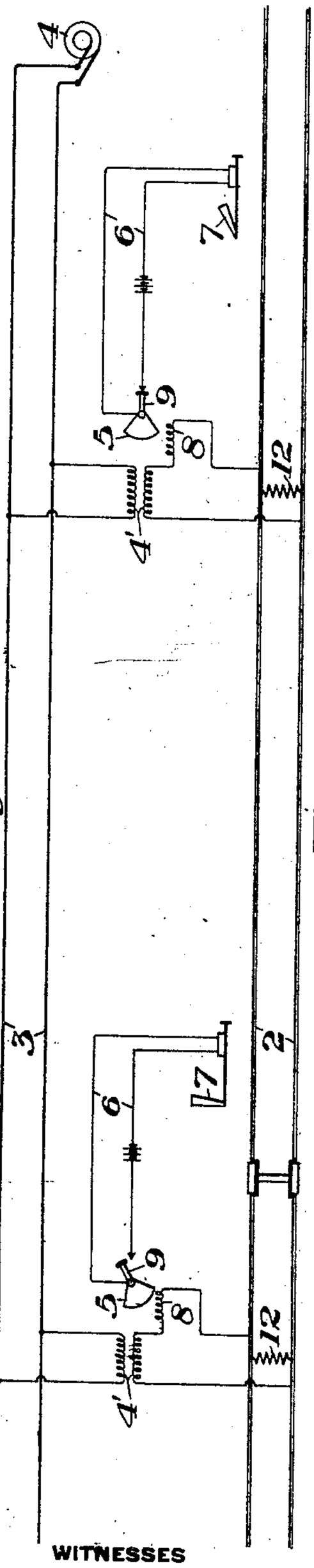


Fig. 2.

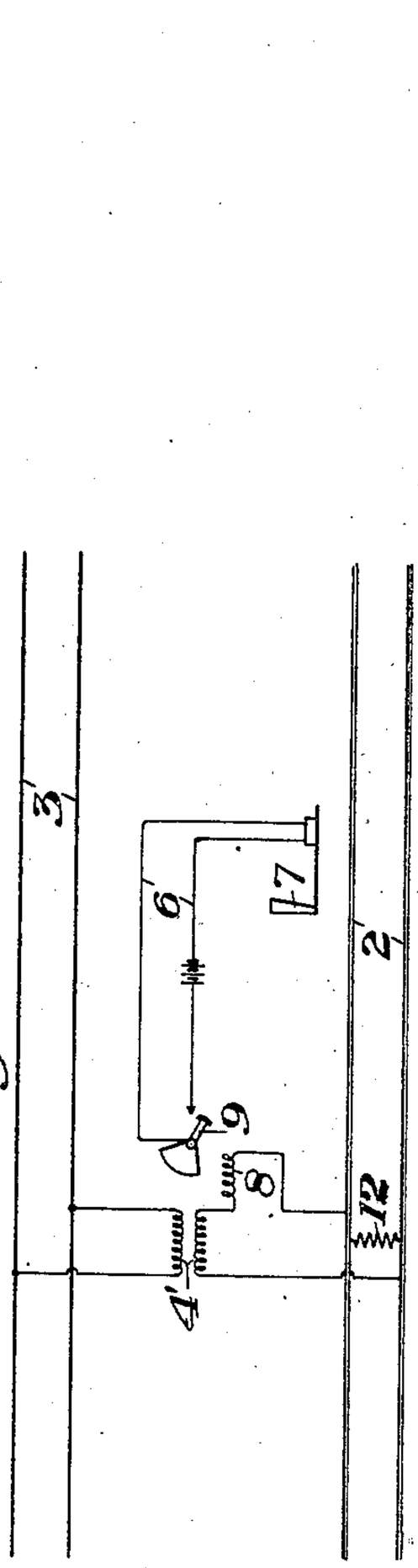
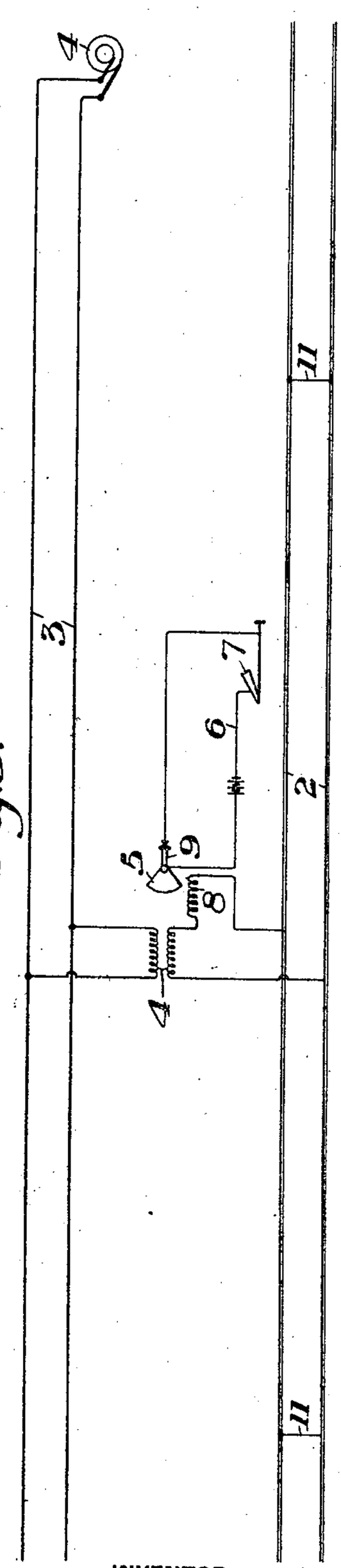


Fig. 3.



WITNESSES

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2 SHEETS—SHEET 2.

Fig. 4.

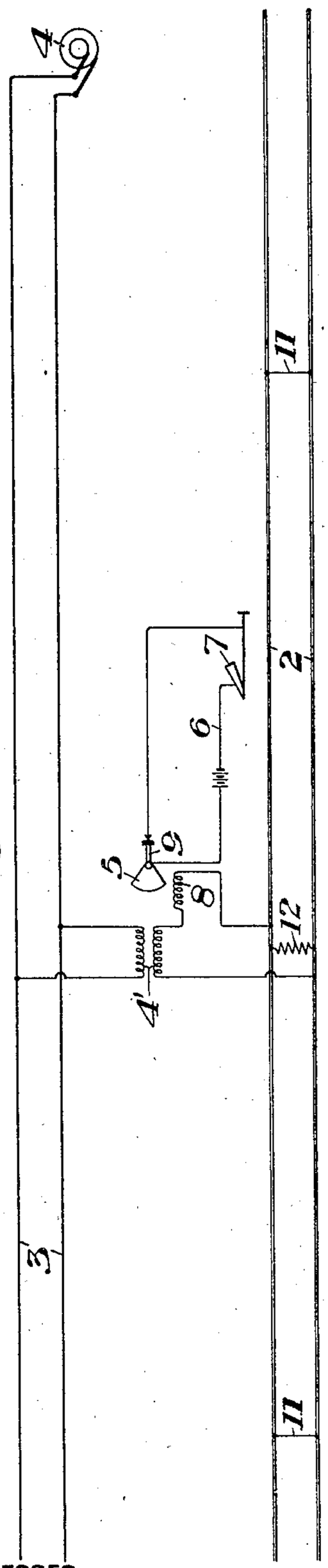


Fig. 5.

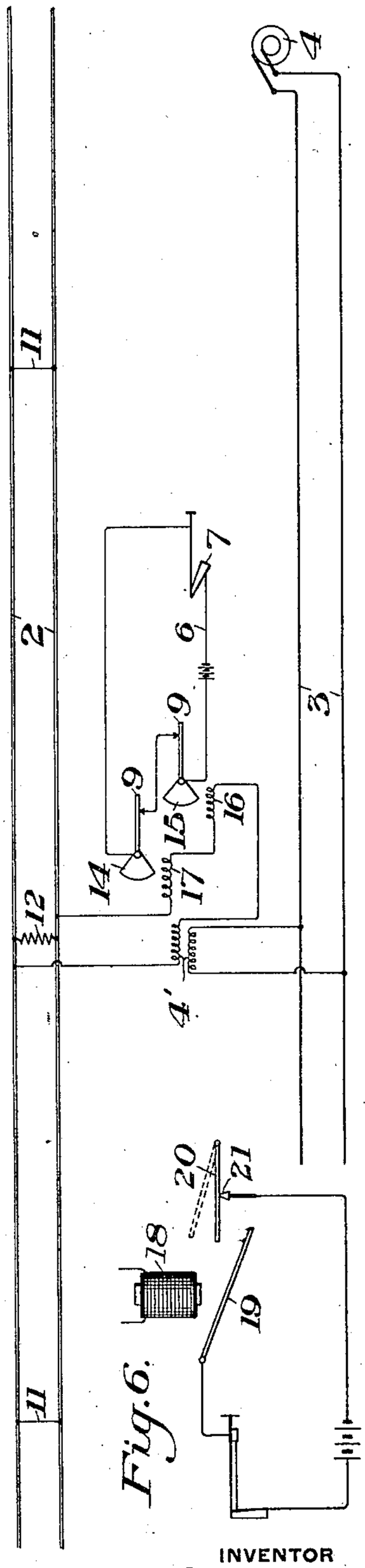
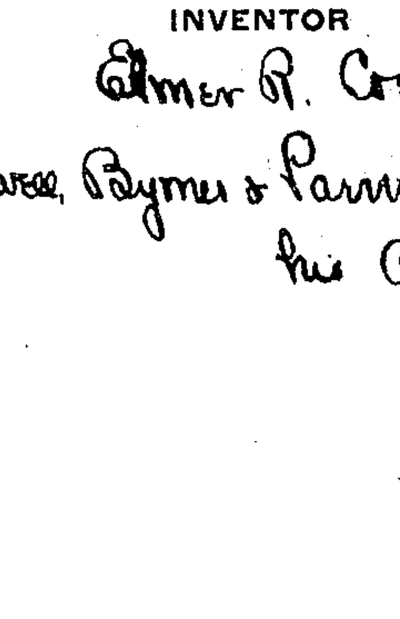


Fig. 6.



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UNITED STATES PATENT OFFICE.

ELMER R. COE, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO THE UNION SWITCH & SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

ELECTRIC SIGNALING SYSTEM

No. 898,324. Specification of Letters Patent. Patented Sept. 8, 1908.

Application filed May 11, 1908. Serial No. 432,041.

To all whom it may concern:

Be it known that I, ELMER R. COE, of Wilkinsburg, Allegheny county, Pennsylvania, have invented a new and useful Electric Signaling System, 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 and 2 are diagrams showing one form of my invention, the two views showing the relay in its three different positions, and Figs. 3, 4 and 5 are diagrams showing three different modifications of my invention, Fig. 6 is a view showing another form of three position relay which may be employed.

My invention has relation to electric signaling systems for railways, and is applicable to those systems wherein the track rails are divided into insulated sections, and also to those systems in which the track rails are electrically continuous throughout for all currents both signaling and propulsion, being of more particular advantage in connection with the last named systems.

My invention consists mainly in a certain novel arrangement and manner of operating the relays which control the track signals, and will be best understood by reference to the accompanying drawings in which I have shown several different forms thereof which will now be described, it being premised, however, that the invention is susceptible of various other changes and embodiments by those skilled in the art without departing from its spirit and scope as defined by the appended claims.

Referring first to that form of my invention which is shown in Figs. 1 and 2, the numeral 2 designates the track rails which are here shown as being electrically continuous for all currents, both signaling and propulsion, instead of being divided into insulated sections. 3 designates transmission lines, supplied by an alternating current generator 4, and from which the signaling current is supplied to the track rails through the transformers 4′ whose secondaries are connected across the rails in the middle of each block or track circuit. 5 designate relays whose movable member through a suitable arrangement of contacts controls the local circuits 6 of the track signals 7. These relays have their energizing coils or windings 8 in series with the secondary coils or windings of the adjacent transformers. The relays shown in these figures are what is known as "wipe contact" relays and have three positions. The normal position is that shown at the right hand side of Fig. 1, in which the signal circuit is closed. When, however, a train approaches within a certain distance of the relay, it short circuits the secondary of the transformer and causes an increased current to flow through the windings 8, thereby increasing the energization of the relay and causing it to move to open the signal circuit, as shown at the left hand side of Fig. 1. The signal controlled by said circuit then goes to danger position in accordance with the well known practice. With a broken wire in the circuit, the relay will go to its third, also open circuit position, as shown in Fig. 2, by the action of a counterweight 9. The distance at which the relays will be operated by an approaching train depends upon the adjustment of the relays, the impedance of the rails, the power factor of the system, the adjustment of resistance 12, and other factors which must be determined in each case by the signal engineer. This distance will, however, vary somewhat under different track conditions, and the signal should therefore be set somewhat in advance of the theoretical block limits to guard against the possibility of their going to danger in the face of an approaching train. This variation may, however, be largely reduced in a number of ways. Thus, in Fig. 1, I have shown resistances 12 connected across the track rails at the points of connections of the transformers. These resistance conductors are so proportioned as to cause a uniform flow of current through coil 8 between the opposite rails to thereby reduce the variations in the total amount of current flowing at different times, due to changes in the ballast resistance under different conditions. This eliminates largely one cause of variation in the block limits and reduces the overlap.

In Fig. 3 I have shown the transformer located midway of the block, the limits of which may be made more definite by the use of cross conductors or bonds 11 between the rails. These cross conductors, or bonds, form closed circuits for the transformer secondaries, and by a proper adjustment of the relays, the latter can be made to go to open circuit position. The bonds 11 serve also to balance the propulsion current in the two

rails. In Fig. 4 I have shown the combination of these same bonds 11 with a resistance conductor or bond 12 connecting the two rails midway between the bonds 11. This resistance conductor acts in the same manner as in Fig. 1 to reduce the variation in the total current flowing at different times in the sections.

For the purpose of reducing the friction of the wipe contacts of the relays, mercury contacts or any other means of any suitable character may be employed.

In Fig. 5 I have shown another form of my invention in which the signal circuit 6 has two relays 14 and 15 with their contacts in series in said circuit, and with their energizing windings 16 and 17 in series with the secondary of the transformer 4'. The relay 15 is adjusted to pick up on a lower voltage than the relay 14, so that when a train enters the block the relay 14 will pick up, causing it to open the signal circuit and set the signal at danger. The relay 15 will open only in case of a broken circuit. The principal object in using the two relays is to avoid the use of a wipe contact relay.

Fig. 6 shows another type of relay which may be employed. In this figure, 18 is a magnet having a pivoted armature 19, which is arranged, when the magnet is energized, to engage the pivoted contact member 20. When the magnet is deënergized, as by a broken circuit, the armature 19 will be in the position shown in this figure. When the circuit of the magnet is intact and no train is in the block, the armature is lifted into engagement with the contact member 20, thus completing the local circuit. When a train comes into the block, the increased current which flows through the magnet coil in the manner above described, causes the armature 19 to lift the member 20 away from the fixed contact 21, and thus opens the local circuit.

While I have shown the track rails as electrically continuous for all currents in all of the forms described, it will be obvious that they may be divided into insulation sections with the usual induction bonds across adjacent sections to permit the passage of the propulsion current from one block to another while confining the signaling current within the blocks.

Various other changes may be made in my invention, since

What I claim is:—

1. In an electric signaling system, a transformer for impressing a signaling current upon the track rails, and a signal-controlling relay having its energizing winding connected in series with the track and between the secondary winding of the transformer and the track; substantially as described.

2. In an electric signaling system, track rails which are electrically continuous, a transformer for impressing a signaling current upon the track rails, and a signal controlling relay having its energizing winding connected in series with the track and between the secondary winding of the transformer and the track; substantially as described.

3. In an electric signaling system, track rails which are electrically continuous, a transformer for impressing a signaling current upon the track rails, and a signal-controlling relay having its energizing winding connected in series with the track and between the secondary winding of the transformer and the track, together with means for reducing the variations in the distance at which the relay will operate; substantially as described.

4. In an electric signaling system, track rails which are electrically continuous, a transformer for impressing a signaling current upon the track rails, and a signal-controlling relay having its energizing winding connected in series with the track and between the secondary winding of the transformer and the track, together with cross-bonds connecting the track rails at intervals; substantially as described.

5. In an electric signaling system, track rails which are electrically continuous, a transformer for impressing a signaling current upon the track rails, and a signal-controlling relay having its energizing winding connected in series with the track and between the secondary winding of the transformer and the track, together with resistance bonds connecting the track rails; substantially as described.

6. In an electric signaling system, track rails which are electrically continuous, a transformer for impressing a signaling current upon the track rails, and a signal-controlling relay having its energizing winding in series with the track and between the secondary winding of the transformer and the track, together with cross bonds connecting the rails at the ends of the block; substantially as described.

7. In an electric signaling system, track rails which are electrically continuous, a transformer for impressing a signaling current upon the track rails, and a signal-controlling relay having its energizing winding connected in series with the track and between the secondary winding of the transformer and the track, together with cross bonds connecting the rails at the ends of the block, and resistance conductors also connecting the rails intermediate said bonds; substantially as described.

8. In an electric signaling system, a transformer having its secondary connected across the track rails for supplying signaling current thereto, a signal circuit and two relays having contacts in series in said circuit

and having their energizing windings in series with each other and with the secondary of the transformer; substantially as described.

9. In an electric signaling system, a transformer having its secondary connected across the track rails for supplying signaling current thereto, a signal circuit and two relays having contacts in series in said circuit and having their energizing windings in series with each other and with the track and between the secondary of the transformer and the track, said relays being adjusted to pick up at different voltages; substantially as described.

10. In an electric signaling system, a transformer for supplying signaling current to the track rails, and a signal controlling relay having a winding connected in series with the track and between the secondary winding of the transformer and the track, the movable member of said relay having two different positions in which it opens a signal circuit and a third position in which it closes said circuit; substantially as described.

11. In an electric signaling system, a source of supply for signaling current, and a signal controlling relay having a winding connected in series with the track and between the source and the track, the movable member of said relay having two different positions in which it opens a signal circuit, and a third position in which it closes said circuit, substantially as described.

In testimony whereof, I have hereunto set my hand.

ELMER R. COE.

Witnesses:
J. B. STRUBLE,
E. E. BRADLEY.