No. 781,161. PATENTED JAN. 31, 1905.

W. G. ROOME.

RAILWAY SIGNALING SYSTEM.

APPLICATION FILED NOV. 17, 1903.

3 SHEETS—SHEET 1.

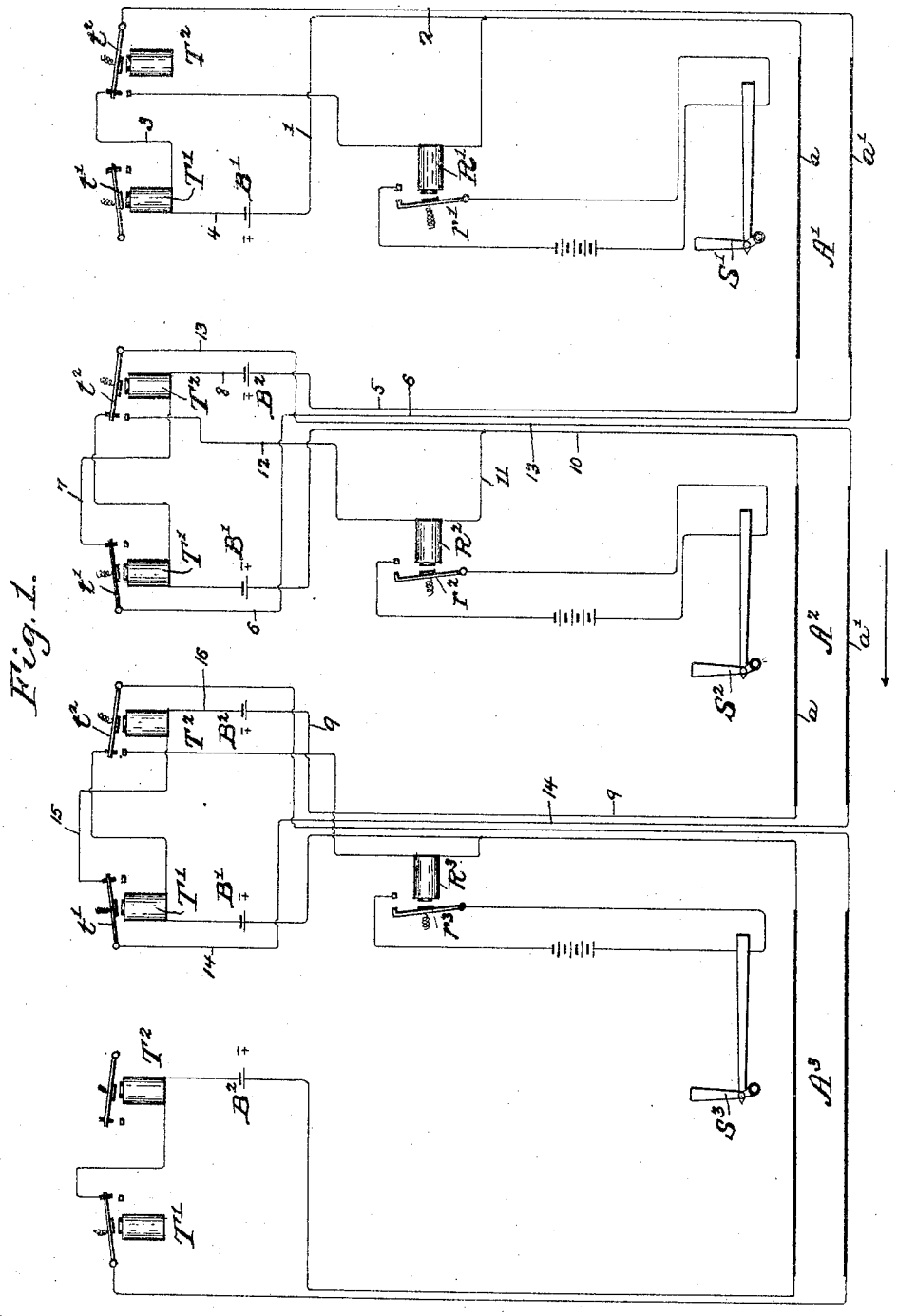

Fig. 1.

Witnesses
B. A. Hinman
F. A. de Berard

Inventor
William G. Roome
By his Attorney
Fred E. Brune.

No. 781,161. PATENTED JAN. 31, 1905.

W. G. ROOME.

RAILWAY SIGNALING SYSTEM.

APPLICATION FILED NOV. 17, 1903.

3 SHEETS—SHEET 2.

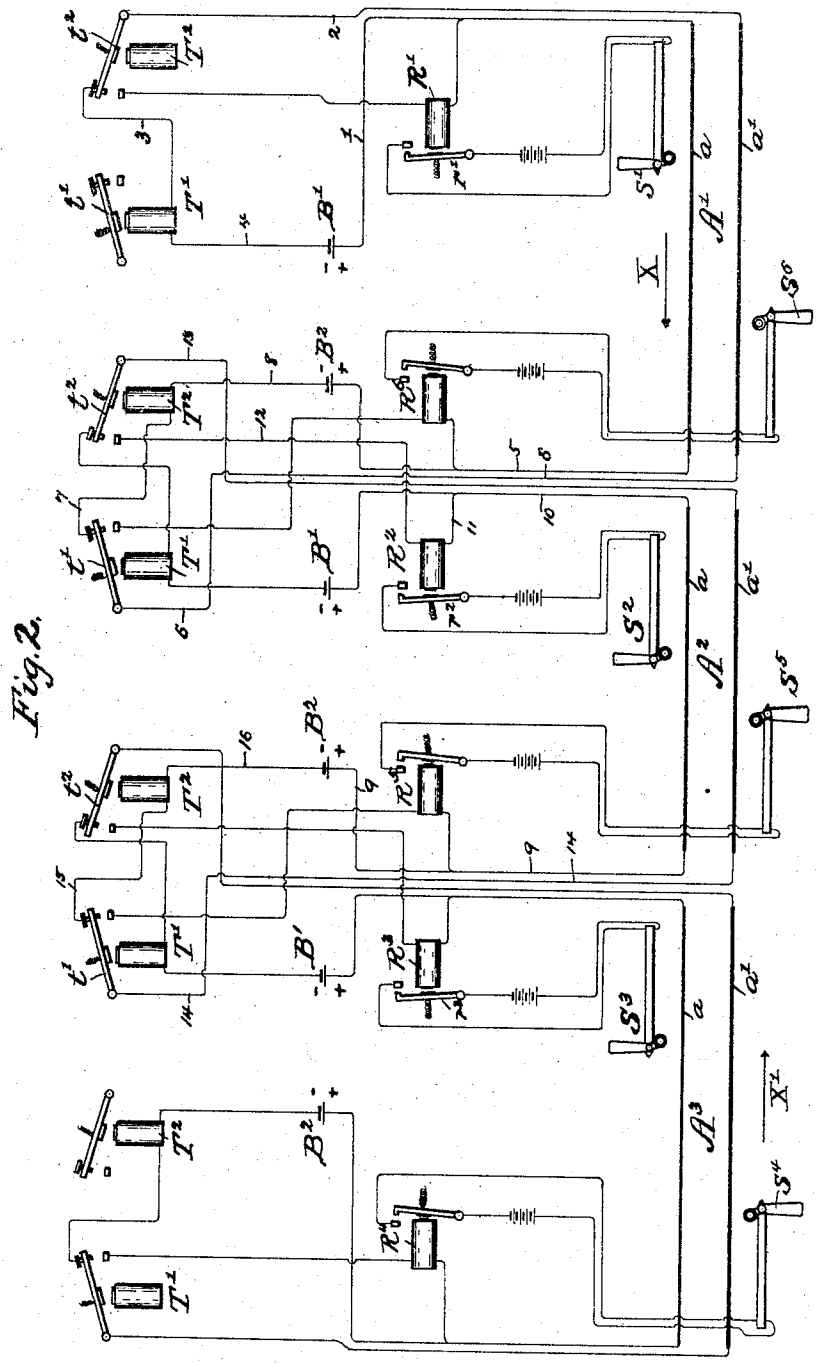

Fig. 2.

Witnesses
B. A. Hinman
S. A. deBerard

Inventor
William G. Roome
By his Attorney
Geo. E. Crouse.

No. 781,161. PATENTED JAN. 31, 1905.

W. G. ROOME.

RAILWAY SIGNALING SYSTEM.

APPLICATION FILED NOV. 17, 1903.

3 SHEETS—SHEET 3.

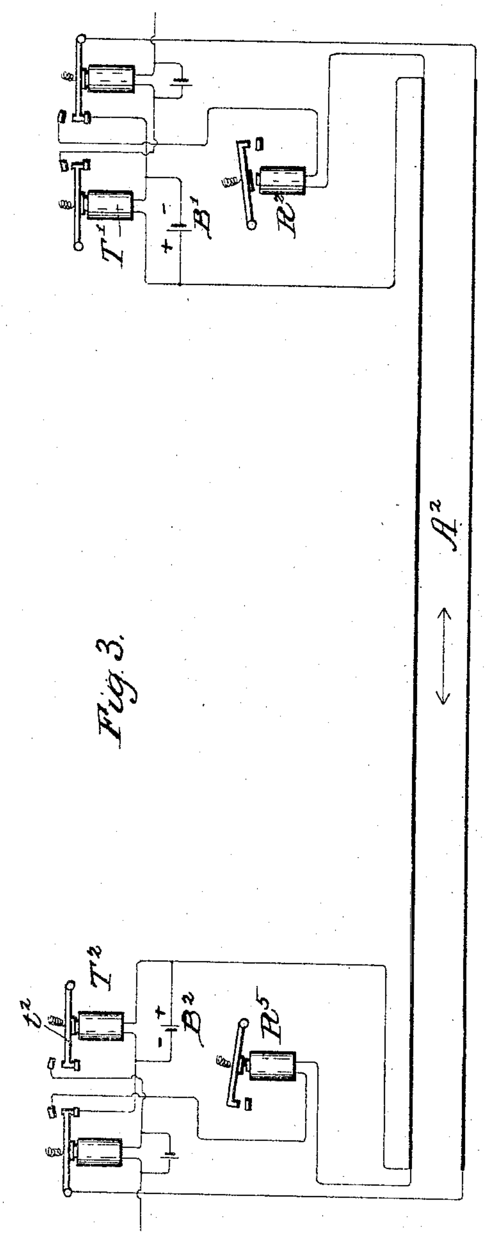

Fig. 3.

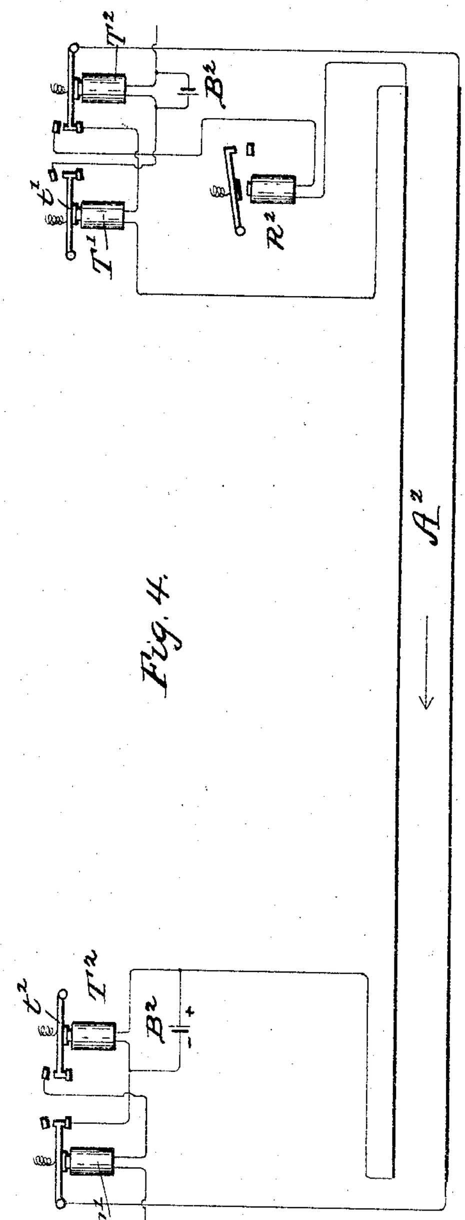

Fig. 4.

Witnesses.

B. A. Hinman

Inventor

William G. Roome

By his Attorney

No. 781,161. Patented January 31, 1905.

UNITED STATES PATENT OFFICE.

WILLIAM G. ROOME, OF JERSEY CITY, NEW JERSEY, ASSIGNOR TO THE UNION SWITCH AND SIGNAL CO., OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

RAILWAY SIGNALING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 781,161, dated January 31, 1905.

Original application filed March 3, 1902, Serial No. 96,536. Divided and this application filed November 17, 1903. Serial No. 181,480.

To all whom it may concern:

Be it known that I, WILLIAM G. ROOME, a citizen of the United States, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Railway Signaling Systems, of which the following is a specification.

My invention relates to railway signaling systems, and particularly to that class of signaling systems the signals or signal devices of which stand normally at "danger"—that is, the signal or signal device is in such position as to indicate to an engineman to stop his train.

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

The present application is a division of my application for patent filed March 3, 1902, Serial No. 96,536.

In the accompanying drawings, Figure 1 is a diagrammatical view of a signaling system embodying my invention as applied to a railway-track on which traffic is in one direction. Fig. 2 is a diagrammatical view of a railway signaling system embodying my invention as applied to a railway-track on which the traffic is in both directions. Figs. 3 and 4 are diagrammatical views of a part of a railway signaling system embodying modifications of my invention.

Similar reference characters designate corresponding parts in all of the figures.

Referring now particularly to Fig. 1, A', A^2, and A^3 designate insulated sections of a railway-track. S', S^2, and S^3 designate signals or signal devices for controlling the passage of trains along the insulated track-sections A', A^2, and A^3 in the direction of the arrow. The signal or signal devices S' S^2 S^3 are here shown as being of the usual semaphore type. These signals may be moved from the danger position of indication (their usual position when the track-sections are not occupied and also when they are occupied) to an inclined or safety position of indication by any desired or suitable mechanism. R', R^2, and R^3 designate electromagnets or relays having armatures r' r^2 r^3, which are adapted to control local circuits embracing an electrically-operated controlling device comprised in or forming a part of the operating mechanisms for the signals S', S^2, and S^3. The electromagnets R', R^2, and R^3 will be hereinafter termed "signal-magnets." Each insulated track-section is provided with two track-relays T' T^2, one being provided at each end of the insulated track-section. Included in the circuits of the track-magnets T' T^2 are batteries B' B^2. These batteries are so arranged in the circuits that the current generated from one battery will oppose the current generated from the other battery. Preferably the current strengths of the batteries B' B^2 will be such as to neutralize each other. With this arrangement of batteries no current will be flowing through either of the track-relays T' T^2, so that their armatures t' t^2 will be on what is generally termed a "back" contact. It will be seen, therefore, that the track-circuits, including the track-relays, are normally deënergized or open, this being true for the reason that no current flows through the track-circuit. The track-relay T' of each track-section is adapted to control a part of the circuit for the preceding track-section, while the track-relay magnet T^2 of each track-section controls the circuit of the signal-magnet for the signal for the succeeding track-section.

In order that the signaling system may be understood, it will be described in its successive operations due to the passage of a train along the track-sections A', A^2, and A^3.

First operation: A train entering the track-section A' will by its wheels and axles form a short circuit for each of the batteries B' B^2 across the track-rails. With this short circuit established the track-relays T' and T^2 at the opposite ends of the track-section A' will be energized by the batteries B' and B^2, respectively. The circuit for the track-relay T' of the track-section A', starting from the battery B', is wire 1, track-rail a, wheels and axles of the train, track-rail a', wire 2, arma-

ture t^2, and back contact of track-relay T^2 of the track-section in the rear of the track-section A', wire 3, track-relay T', and wire 4 to battery. The circuit for track-relay T^2 of track-section A', starting from the battery B^2, is wire 5, rail a, wheels and axles of the train, rail a', wire 6, armature t', and back contact of track-relay T' of the track-section A^2, wire 7, track-relay T^2, and wire 8 back to battery. The armature t' of track-relay T' when attracted to its front contact will break the circuit of the track-relay T^2 of the track-section in the rear of A', and the armature t^2 of the track-relay T^2 when moved to its front contact will close a circuit for the signal-magnet R^2, which, starting from the battery B^2 of the track-section A^2, is wire 9, track-rail a of the track-section A^2, wires 10 and 11, signal-magnet R^2, wire 12, front contact and armature t^2 of the relay T^2 of track-section A', wire 13, rail a' of track-section A^2, wire 14, armature t', and back contact of track-relay T' of track-section A^3, wire 15, track-relay T^2 of track-section A^2, and wire 16 back to battery. The resistances of any track-relay which might be included in the circuit of any signal-magnet are of a resistance higher than that of any signal-magnet, or they may be of the same resistance, and mechanical means may be provided for preventing the track-relays operating at the same time as the signal-magnet. The signal-magnet R^2 of the signals S^2 will attract its armature and close the local circuit of the mechanism for moving the signal S^2 to the safety position, provided, however, that a train is not on the track-section A^3 or upon the track-section A^3. If a train were on the track-section A^2, the circuit for the signal-magnet R^2 from the battery B^2 would be shunted from the signal-magnet R^2 by the wheels and axles of the train on track-section A^2, and if a train were on track-section A^3 the relay T' of track-section A^3 would be energized to attract its armature t', and thus open the circuit for the signal-magnet R^2 at that point. The relay T' of track-section A' will, through its armature t', open the track-circuit of the track-relay T^2 of the section in the rear of insulated section A', and with this track-circuit open at this point it would be impossible to clear the signal S' or the signal of the section in the rear of section A' by the presence of a train on either of the two track-sections in the rear of section A'. As soon as the first pair of wheels bridge the rails $a\ a'$ of track-section A' the battery B^2, which energizes the signal-magnet R', is short-circuited by the wheels and axles of the train on track-section A', thus allowing the signal S' to go to the danger position. The signal, it would be understood, was previously in the safety position of indication before the train entered the track-section A', it being brought to that position by the action of the train on the track-section in the rear of track-section A'.

Second operation: As a train enters track-section A^2, which is permitted by reason of the signal S^2 being in the safety position, it being brought to this position by the presence of the train in track-section A' in the manner hereinbefore described, the signal S^2 is put to the danger position by the short-circuiting of the signal-magnet R^2 in the manner described in connection with the train in track-section A'. When the train completely enters the track-section A^2, the track-relays T' and T^2 of this section will be energized by their respective batteries B' and B^2 in a manner similar to that described in connection with the track-relays T' and T^2 of track-section A'. The track-relay T' of track-section A^2 by attracting its armature t' will open the circuit in which the battery B^2 of track-section A' is included, and thus prevent a train in the track-section in the rear of track-section A' from clearing the signal S'. This will be the case until the train completely passes out of the track-section A^2. The track-relay T^2 of track-section A^2 will close the circuit for the signal-magnet R^3 from the battery B^2 of track-section A^3, and thus clear the signal S^3, provided no train is in the track-section A^3 or the track-section beyond A^3.

The first and second operations hereinbefore described will take place as the train proceeds along the succeeding track-sections. It will be seen that a signal can only be cleared by a train when the two succeeding track-sections are free of trains and that as the train proceeds through a track-section not only the signal behind it controlling the track-section through which the train is proceeding, but the signal controlling the second track-section in its rear, are locked to "danger."

Referring now to Fig. 2, precisely the same arrangement of track-relays, signal-magnets, and circuits for the respective relays and magnets are employed for the trains proceeding in the directions of the arrow X as that shown in Fig. 1. For the trains proceeding in the direction of the arrow X' the only additions are the signal-magnets R^4, R^5, and R^6 and their circuits, controlling, respectively, the signals S^4, S^5, and S^6. In this arrangement as the train proceeds in the direction of the arrow X the signals in advance and in the rear of the train are operated in precisely the same manner as described in connection with Fig. 1. In addition to this, assuming a train to be in the track-section A'', the signals S^5 and S^6 are locked to the danger position against a train in the track-section A^3 approaching the train in the track-section A'. The action of the train in the track-section A'' closes the circuit of the relay T^2, as heretofore explained in connection with Fig. 1, and opens the track-circuit at this point of the track-section A^2 at the back contact t^2, so that the signal S^6, which is in the danger position, cannot be set to the safety position by the presence of a train in the track-section A^2 on account

of the relay T′ being cut out of the circuit. The signal S^5 of the track-section A^2 is also locked to the danger position by the action of the relay T^2 of track-section A^2. This relay T^2 cuts out of the track-circuit of track-section A^2 the battery B′ of track-section A^2, so that the signal-magnet R^5 cannot be energized from this battery to clear the signal S^5. It will thus be seen that a train proceeding in either direction of travel has two danger-signals in advance and also two danger-signals in its rear. Assuming a train to be in track-section A′, there being no trains in the track-sections A^2 and A^3, the signal S^2 would be set to "safety" to allow it to proceed. Supposing a train to now enter track-section A^3, the signal S^2 will immediately come to "danger," and the train proceeding along track-section A′ will be stopped at that point. Also the train proceeding along track-section A^3 will be stopped by the danger-signal S^5, which is locked to the danger position, and thus both trains are stopped a full block apart.

Referring now to Fig. 3, which illustrates a single track-section—for example, the track-section A^2 of Fig. 2—the batteries B′ and B^2, instead of being placed in series with their respective relays T′ and T^2, as shown in Fig. 2, are placed in multiple. With this arrangement the relays T′ and T^2 are always closed, and their armatures t' and t^2 are attracted to their front contacts instead of resting on their back contacts, as shown in Fig. 2. When a train enters the track-section A^2, the batteries B′ and B^2 are short-circuited from the relays by the wheels and axles of the train, thus deenergizing the relays T′ and T^2 and allowing their armatures to move onto the back contacts. The circuits for the respective signal-magnets are open, as described in connection with Figs. 1 and 2, and the action of the track-relays T′ and T^2 is reversed from that described in connection with Fig. 2, and to secure the interlocking of the adjoining track-circuits it is only necessary to reverse the contacts. In this form of the invention there need be no difference in the resistances of the track-relays and signal-magnets nor need there be any mechanical devices for preventing one operating while the other is operating as described in connection with Figs. 1 and 2. In this form of the invention when a track-relay T′ is deënergized it cuts into the circuit of the battery B^2 of the succeeding section the signal-magnet of that section.

Fig. 4 discloses substantially the same invention as that disclosed in Fig. 3, with the exception that the signal-magnet R^5 and its circuit are eliminated and also the battery B′, the relay T′ being energized from battery B^2 at the opposite end of the section. These parts are not necessary for the reason that the invention shown in Fig. 4 is adapted for railways in which traffic is in one direction only, as indicated by the arrow.

What I claim as my invention is—

1. In a signaling system, the combination of a series of insulated track-sections, a signal for each insulated track-section, a relay provided at each end of each track-section, said relays being adapted when a train is in a track-section to break the circuit of a track-relay of the track-section in the rear and to close a circuit for the signal of the track-section in advance.

2. In a signaling system, the combination of a series of insulated track-sections, the rails of which are included in normally deënergized circuits, a signal for each insulated track-section, a relay provided at each end of each insulated track-section, said relays of each track-section being adapted, one to break the circuit of a track-relay of the track-section in the rear, and the other to close a circuit for the signal of the track-section in advance.

3. The combination in a signaling system of a series of insulated track-sections, a relay and battery for each end of each track-section, the batteries and relays being in circuit with the rails of its track-section and the batteries being arranged to oppose each other, a signal for each track-section, a signal-magnet for controlling a local circuit for the signal of each track-section, each signal-magnet being included in an open circuit which open circuit is adapted to be closed through one of the relays of a track-section and to then form part of one of the track-circuits.

4. The combination in a signaling system of a series of insulated track-sections, a relay and battery for each end of each track-section, the batteries and relays being in circuit with the rails of its track-section and the batteries being arranged to oppose each other, each relay being adapted to break the circuit of an adjoining track-section, and a signal-magnet controlling a local circuit for each track-section.

5. In a signaling system, the combination with a series of normally deënergized rail-circuits, each including two relays and two batteries, which batteries are opposed to each other, and said rail-circuits being carried through the armatures of the relays of the adjoining track-circuits, a series of normally open signaling-circuits, each signaling-circuit including the armature of a track-relay of the block next in advance.

6. In a signaling system, the combination with a series of normally open rail-circuits, each including two relays and two batteries, which batteries are opposed to each other, and said rail-circuits being carried through the armatures of the relays of the adjoining track-circuits, a series of normally open signaling-circuits, each signaling-circuit including the armature of a track-relay of the block next in advance and next in the rear.

7. In a signaling system, the combination with a series of normally deënergized rail-cir-

cuits, each including two relays and two batteries, which batteries are opposed to each other, and said rail-circuits being carried through the armatures of the relays of the adjoining track-circuits, a series of normally open signaling-circuits, each signaling-circuit comprising the rails of the insulated track-section.

8. In a track-circuit for a railway-signaling system, comprising two batteries or sources of electrical supply arranged to oppose each other, a track-relay located at or near each end of the track-circuit, a signal-magnet located at or near each end of each block-section, and two normally open shunts or branch circuits including the signal-magnets.

9. In a block-signaling system, the combination with a series of normally deënergized rail-circuits each including two batteries which are opposed to each other, a series of normally open or broken signaling-circuits, each signaling-circuit including a circuit-closer constructed to be operated by a train bridging the rails of a rail-circuit.

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

WM. G. ROOME.

Witnesses:
G. C. HOFFNER,
JAS. H. REILLY.