H. W. GRIFFIN.

SIGNALING SYSTEM FOR RAILWAYS.

APPLICATION FILED SEPT. 21, 1908.

1,000,402.

Patented Aug. 15, 1911.

3 SHEETS—SHEET 1.

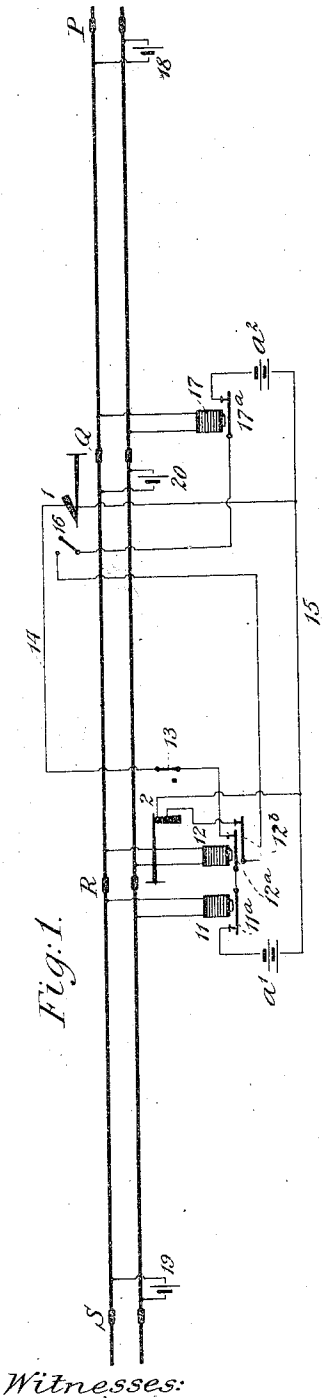

Fig. 1.

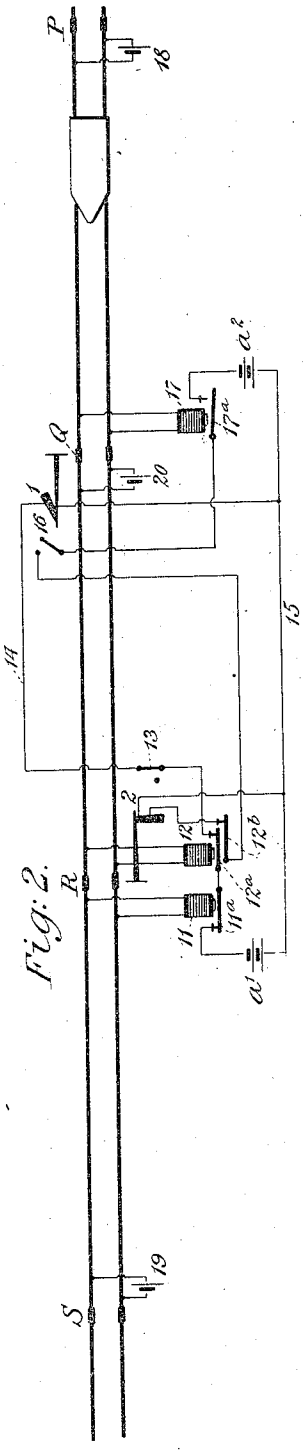

Fig. 2.

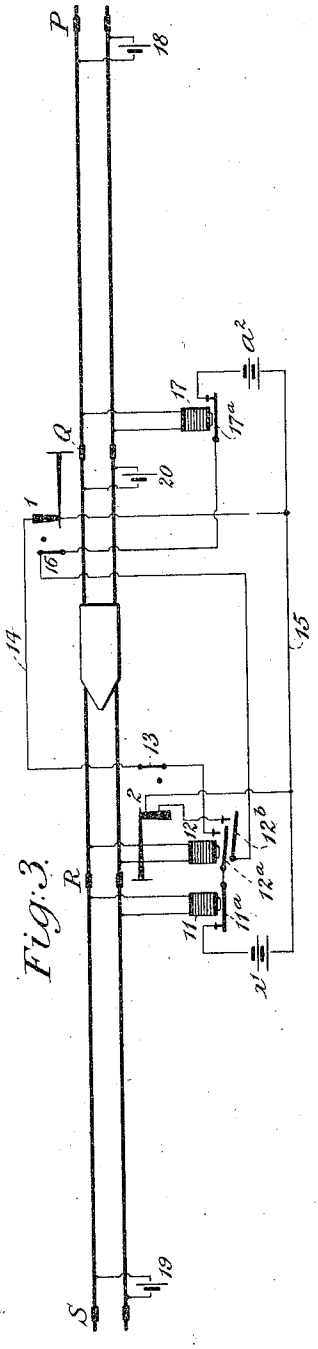

Fig. 3.

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3 SHEETS—SHEET 2.

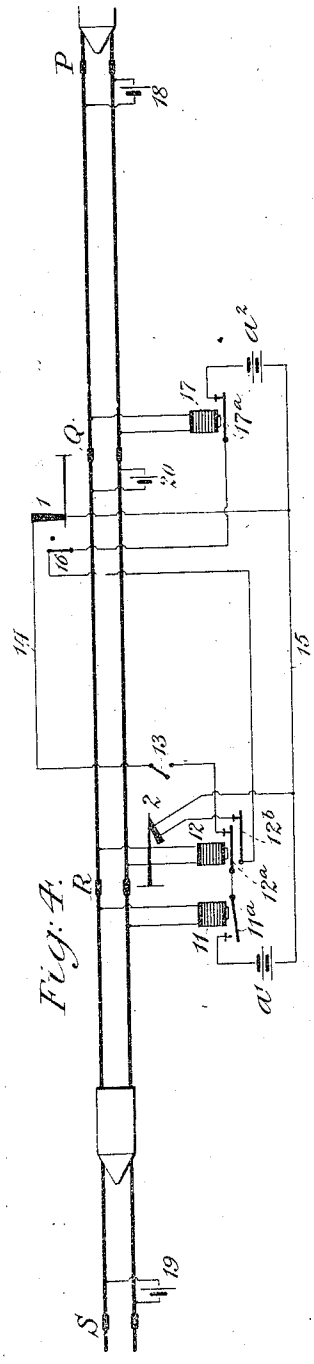

Fig. 4.

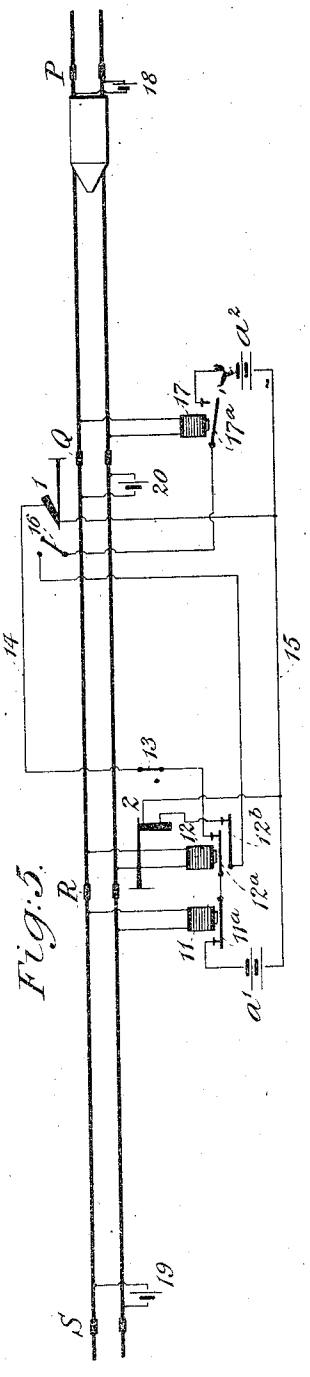

Fig. 5.

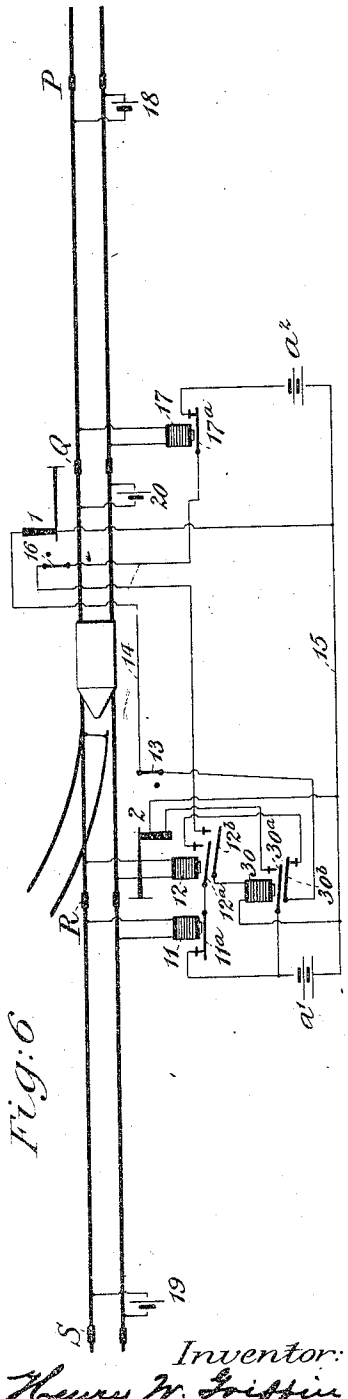

Fig. 6

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3 SHEETS—SHEET 3.

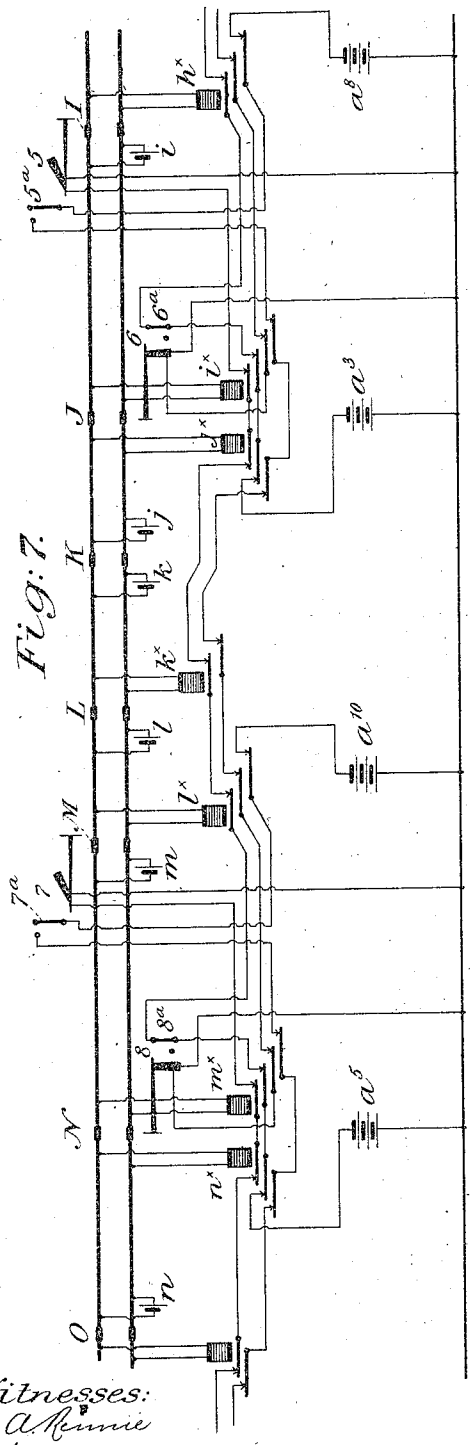

Fig. 7.

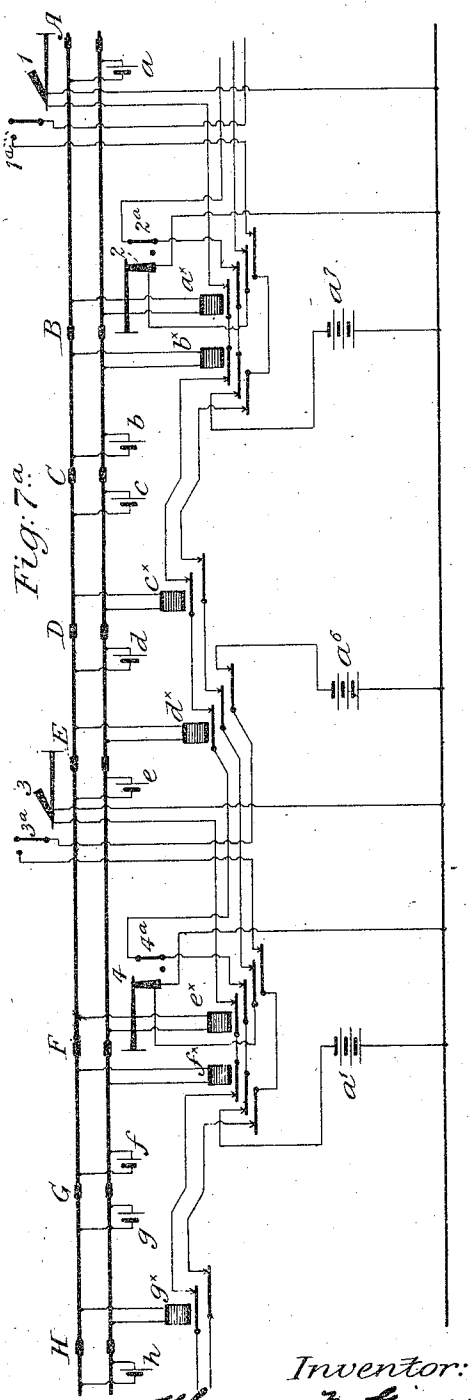

Fig. 7.a.

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UNITED STATES PATENT OFFICE.

HENRY W. GRIFFIN, OF NEW YORK, N. Y., ASSIGNOR TO THE UNION SWITCH & SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

SIGNALING SYSTEM FOR RAILWAYS.

1,000,402. Specification of Letters Patent. Patented Aug. 15, 1911.

Application filed September 21, 1908. Serial No. 454,067.

To all whom it may concern:

Be it known that I, HENRY W. GRIFFIN, a citizen of the United States, residing in the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Signaling Systems for Railways, of which the following is a specification.

My invention relates to automatic block signaling systems for single track railways.

The object of the invention is to provide a system by which the position of one signal is absolutely dependent upon the position of the opposing signal and more specifically that one signal cannot be moved to safety position unless the opposing signal is in danger position.

The system also includes means by which a train approaching a signal set to danger may, provided the block be clear, set such signal to safety after having first set the opposing signal to danger.

I will describe preferred embodiments of my invention and then point out the novel features in claims.

In the accompanying drawings, Figures 1 to 5 inclusive are diagrammatic views illustrating the application of my invention to a single block protected at its ends by opposing signals, the parts being shown in different positions. Fig. 6 is a similar view showing the application of my invention to a single block including a switch. Figs. 7 and 7ª together form a diagrammatic view illustrating the application of my invention to a plurality of blocks each of which comprises a series of insulated sections, Fig. 7 being a continuation of Fig. 7ª from the left hand end.

Referring now to Figs. 1 to 5, I have shown a track divided into track sections P—Q, Q—R and R—S, of which the block Q—R is protected at its ends by opposing signals 1 and 2. The track sections P—Q and R—S, which may be termed preliminary sections, are each provided with a track battery, indicated respectively by 18 and 19 and with a track relay, indicated respectively by 17 and 11. The current for operating signal 1 is derived from battery a^1 and that for operating signal 2 from battery a^2. The block Q—R is also provided with a track relay 12, which controls armatures 12^a and 12^b included respectively in the circuits for signals 1 and 2, and it is also provided with a track battery 20 from which the relay 12 derives current. In Fig. 1 the parts are shown in normal position with track clear from P to S and signal 1 at safety position to permit a train to move from P toward S. Circuit for signal 1 is closed from battery a^1 by way of armatures 11^a, 12^a, circuit controller 13 of signal 2, wire 14, through signal 1 to wire 15 back to battery. The circuit for signal 2 from battery a^2 is open at circuit controller 16 of signal 1. If now a train enters section P—Q relay 17 will be short circuited and armature 17^a will drop away and make another break in the circuit of signal 2 as shown in Fig. 2, but this will have no effect on either signal under existing circumstances. When the train passes on to block Q—R relay 12 will be short circuited and armatures 12^a and 12^b will drop away and break the circuits of both signals. Signal 1 will then move to danger and close its circuit controller 16, and relay 17 will attract its armature 17^a thus closing the circuit for signal 2 at points where it was previously broken. This circuit is however still broken at armature 12^b and will remain so as long as the train is on block Q—R as shown in Fig. 3, so that both signals will be at danger while a train is on said block. When the train enters section R—S, relay 11 will be short circuited and its armature 11^a will drop away and make another break in the circuit of signal 1, and as soon as the train passes off block Q—R relay 12 will be again energized and close both circuits at armatures 12^a and 12^b. Signal 2 will then be moved to safety as indicated in Fig. 4 and open the circuit for signal 1 at the circuit controller 13. When the train passes off section R—S the circuit for signal 1 will be again closed at armature 11^a but will still be open at circuit controller 13 and signal 1 will remain at danger. The foregoing description in connection with the figures referred to clearly describes and illustrates the broad idea involved in the invention, viz. that a signal cannot be moved to safety until after the opposing signal is at danger. Suppose now a train should approach preliminary section P—Q while the signals are in the positions shown in Fig. 4, and that no train were on the track between Q and S. When the train enters preliminary section P—Q (see Fig.

5) the circuit for signal 2 will be broken at armature 17^a and signal 2 will go to danger and close circuit controller 13, thereby closing the circuit for signal 1 which will then be moved to safety and open the circuit for signal 2 at circuit controller 16. The train can then proceed and will affect the signals as heretofore described. If, however, a train should enter section R—S from S while another train is on section P—Q, the two circuits will be opened at 11^a and 17^a respectively and both signals will be at danger and neither train can enter block Q—R.

Should there be a switch in the block Q—R and the train should leave the block via such switch, see Fig. 6, and the signal circuits were as shown in Fig. 3 the result would be that as soon as the train was off the block Q—R, both signal circuits would close at 12^a and 12^b and both signals would start to clear and thus break circuits with the result that both would keep moving slightly down and up. It is of course necessary to prevent such action and for this purpose the modification illustrated in Fig. 6 is introduced. As shown another relay 30 is employed which controls two armatures 30^a and 30^b. The relay 30 is connected to the armature 12^b and to the return wire 15. When therefore armature 12^b is closed a circuit will be established through the relay 30 from battery a^2 via armature 17^a circuit controller 16, armature 12^b through the relay 30, to wire 15 and battery. The armature 30^a will then be attracted and engage a contact in the circuit of signal 2 and thereby close a circuit from battery a^1 to armature 30^a through signal 2 to wire 15 and battery. The armature 30^b, when magnet 30 is deënergized engages a contact connected to the contact which armature 12^a engages, and therefore when the circuit is closed at 12^a a circuit for signal 1 will be established as follows: battery a^1, armatures 11^a, 12^a and 30^b circuit controller 13 through signal 1 to wire 15 and battery. It will be seen therefore that only one of the above circuits can be closed at the same time and consequently one or the other signals will be moved to safety, depending only on the condition of relay 30. With electric semaphores this arrangement does not require an extra relay as the regular signal motor relay required in the line circuit can be employed.

Referring now to Figs. 7 and 7^a which show an extended application of the principles involved in my invention as already described in connection with Figs. 1 to 5, it will be remembered that Fig. 7 shows a continuation of the track, signals, circuits, etc., from the left hand end of Fig. 7^a. It will be observed that the track between any two signals on the same side thereof is divided into a plurality of insulated sections. The sections or blocks are marked consecutively A to O inclusive, and the signals which control trains running from A to O are marked respectively 1, 3, 5 and 7 while those which control trains from O to A are marked respectively 8, 6, 4 and 2. The signals 1, 3 and 5 derive their current respectively from batteries a^1, a^3 and a^5, and signals 6 and 8 derive their current from batteries a^6 and a^8 respectively. Signals 2 and 4 will derive their currents from batteries, not shown, to the right of battery a^7. Battery a^{10} will supply current to a signal, not shown, to the left of signal 8, and battery a^7 will supply current to a signal, not shown, to the right of signal 1. Each insulated section has a battery connected to it indicated respectively by a, b, c, d, e, f, g, h, i, j, k, l, m and n, and these batteries supply current respectively to track relays a^x, b^x, c^x, d^x, e^x, f^x, g^x, h^x, i^x, j^x, k^x, l^x, m^x and n^x, which control armatures included in the signal circuits. Assuming the signals to be in the positions indicated, a train entering at A could pass through to O provided no train was on the track running from O to A. When the train enters the section A—B the relay a^x will be short circuited and the circuits through signals 1 and 4 will be broken and the signal 1 will go to danger and close the circuit controller 1^a which is included in the circuit of signal 4 and which previously was the break in said circuit. As the train progresses the relays b^x, c^x, d^x and e^x will be successively short circuited and cause breaks in the circuits of signals 1 and 4 so that both will remain at danger, while the relays to the rear of the train will successively be energized and close the two circuits at those points. When the train passes off section F—E, the relay e^x will be energized and close the circuits for signals 1 and 4 and the latter will be moved to safety position and thereby open its circuit controller 4^a which is included in the circuit of signal 1 and the latter will thus remain at danger. In the same way, as the train progresses, signals 3 and 5 will be set to danger and signals 6 and 8 will be set to safety, and before signal 8 is moved to safety, signal 7 will have moved to danger. Suppose now, with the signals set as indicated, a train enters section O—N traveling toward A and there is a train on the track between signals 3 and 5. Under such conditions relay n^x will be short circuited and the circuits through signals 7 and 5 broken thereby putting both of these signals to danger and closing circuit controllers 7^a and 5^a the latter of which is in the circuit of signal 8 and, the latter circuit having been otherwise closed, the signal 8 will then be moved to safety and the train can proceed toward signal 6. The latter signal

cannot, however, be moved to safety because its circuit will be broken by the train between signals 3 and 5 at either one or the other of the relays e^x, f^x, g^x, or h^x, and consequently one train cannot, without disregarding signals, move beyond signal 5 and the other cannot move beyond signal 6 and one or the other will have to be side-tracked to permit the other train to pass. It will thus be seen that approaching trains will cause opposing adjacent signals to both indicate danger.

Having thus described my invention, I claim:

1. In a railway signaling system, the combination of a block section, a track circuit for the block section, a railway signal located at each end of the block section for governing the passage of cars or trains in opposite directions through the block section, a signal circuit for each signal, each of which signal circuits is controlled by the said track circuit, and circuit controllers, one operated by each signal and included in the circuit for the signal at the opposite end of the block section.

2. In a railway signaling system, the combination of a block section, a track circuit for said block section comprising a source of current and a relay, a railway signal located at each end of said block section to govern the passage of cars or trains in opposite directions through said block section, a signal circuit for each railway signal each of which signal circuits is controlled by the relay of the block section, and circuit controllers, one operated by each signal and included in the circuit for the signal at the opposite end of the block section.

3. In a railway signaling system, the combination of a block section, a track circuit for said block section comprising a source of current and a relay, a preliminary section extending in one direction from the block section, a track circuit for the preliminary section including a source of current and a relay, a railway signal located at each end of the block section for governing the passage of cars or trains in opposite directions through the block section, a signal circuit for each of said railway signals, each of which signal circuits is controlled by the relay for the block section and one of which signal circuits is controlled also by the relay for the preliminary section, and circuit controllers, one operated by each signal and included in the circuit for the signal at the opposite end of the block section.

4. In a railway signaling system, the combination of a block section, a track circuit for said block section comprising a source of current and a relay, a preliminary section extending in one direction from the block section, a track circuit for the preliminary section including a source of current and a relay, a railway signal located at each end of the block section for governing the passage of cars or trains in opposite directions through the block section, a signal circuit for each of said signals, each of which signal circuits is controlled by the relay for the block section, the circuit for the signal at the opposite end of the block section from the preliminary section being controlled also by the relay for the preliminary section, and circuit controllers, one operated by each signal and included in the circuit for the signal at the opposite end of the block section.

5. In a railway signaling system, the combination of a block section, a track circuit for the block section comprising a source of current and a relay, a preliminary section extending in each direction from the block section, a track circuit for each preliminary section each of which includes a source of current and a relay, a railway signal located at each end of the block section for governing the passage of cars or trains in opposite directions through the block section, a signal circuit for each of said signals, each of which signal circuits is controlled by the relay for the block section, the circuit for each signal being controlled also by the relay for the preliminary section extending from the end of the block section opposite to such signal.

6. In a railway signaling system, the combination of a block section, a track circuit for the block section comprising a source of current and a relay, a preliminary section extending in each direction from the block section, a track circuit for each preliminary section each of which includes a source of current and a relay, a railway signal located at each end of the block section for governing the passage of cars or trains in opposite directions through the block section, a signal circuit for each of said signals, each of which signal circuits is controlled by the relay for the block section, the circuit for each signal being controlled also by the relay for the preliminary section extending from the end of the block section opposite to such signal, and circuit controllers, one operated by each signal and included in the circuit for the signal at the opposite end of the block section.

7. In a railway signaling system, the combination of a block section, a plurality of track circuits for the block section each of which comprises a source of current and a relay, a preliminary section extending in each direction from the block section, a track circuit for each preliminary section each of which includes a source of current and a relay, a railway signal located at each end of the block section for governing the passage of cars or trains in opposite directions through the block section, a signal circuit for each of said signals, each of which

signal circuits is controlled by the relay for each of the track circuits in the block section, the circuit for each signal being controlled also by the relay for the preliminary section extending from the end of the block section opposite to such signal.

8. In a railway signaling system, the combination of a block section, a plurality of track circuits for the block section each of which comprises a source of current and a relay, a preliminary section extending in each direction from the block section, a track circuit for each preliminary section each of which includes a source of current and a relay, a railway signal located at each end of the block section for governing the passage of cars or trains in opposite directions through the block section, a signal circuit for each of said signals, each of which signal circuits is controlled by the relay for each of the track circuits in the block section, the circuit for each signal being controlled also by the relay for the preliminary section extending from the end of the block section opposite to such signal, and circuit controllers, one operated by each signal and included in the circuit for the signal at the opposite end of the block section.

9. In a railway signaling system, a plurality of block sections, a plurality of track circuits for each block section, each of which track circuits comprises a source of current and a relay, a preliminary section extending in each direction from each block section, a track circuit for each preliminary section each of which comprises a source of current and a relay, a railway signal located at each end of each block section for governing the passage of cars or trains in opposite directions through said block sections, a signal circuit for each of said signals, each of which signal circuits is controlled by the relay for each of the track circuits in the block section through which the signal governs traffic, the circuit for each signal being controlled also by the relay for the preliminary section extending from the end of such block section opposite to such signal, and circuit controllers, one operated by each signal and included in the circuit for the signal at the opposite end of the block section.

10. In a railway signaling system, the combination of a block section, a track circuit for the block section, a railway signal located at each end of the block section for governing the passage of cars or trains in opposite directions through the block section, a signal circuit for each of said signals each of which signal circuits is controlled by the track circuit, and a circuit controller operated by one of said signals and included in the circuit for the other of said signals.

11. In a railway signaling system, a plurality of track circuits each comprising a source of current and a relay, a plurality of block sections, each comprising one or more of said track circuits, a railway signal located at each end of each block section for governing the passage of cars or trains in opposite directions through the block section, a signal circuit for each of said signals, each of which signal circuits is controlled by the relay for each of the track circuits included in the block section, and also by the relay of the track circuit extending from the end of the block section opposite to such signal.

12. In a railway signaling system, a plurality of track circuits each comprising a source of current and a relay, a plurality of block sections, each comprising one or more of said track circuits, a railway signal located at each end of each block section for governing the passage of cars or trains in opposite directions through the block section, a signal circuit for each of said signals, each of which signal circuits is controlled by the relay for each of the track circuits included in the block section, and also by the relay of the track circuit extending from the end of the block section opposite to such signal, and circuit controllers, one operated by each signal and included in the circuit for the signal at the opposite end of the block section.

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

HENRY W. GRIFFIN.

Witnesses:
M. S. KIRTLAND,
W. F. WOOD.