T. H. PATENALL & W. W. TALBERT.

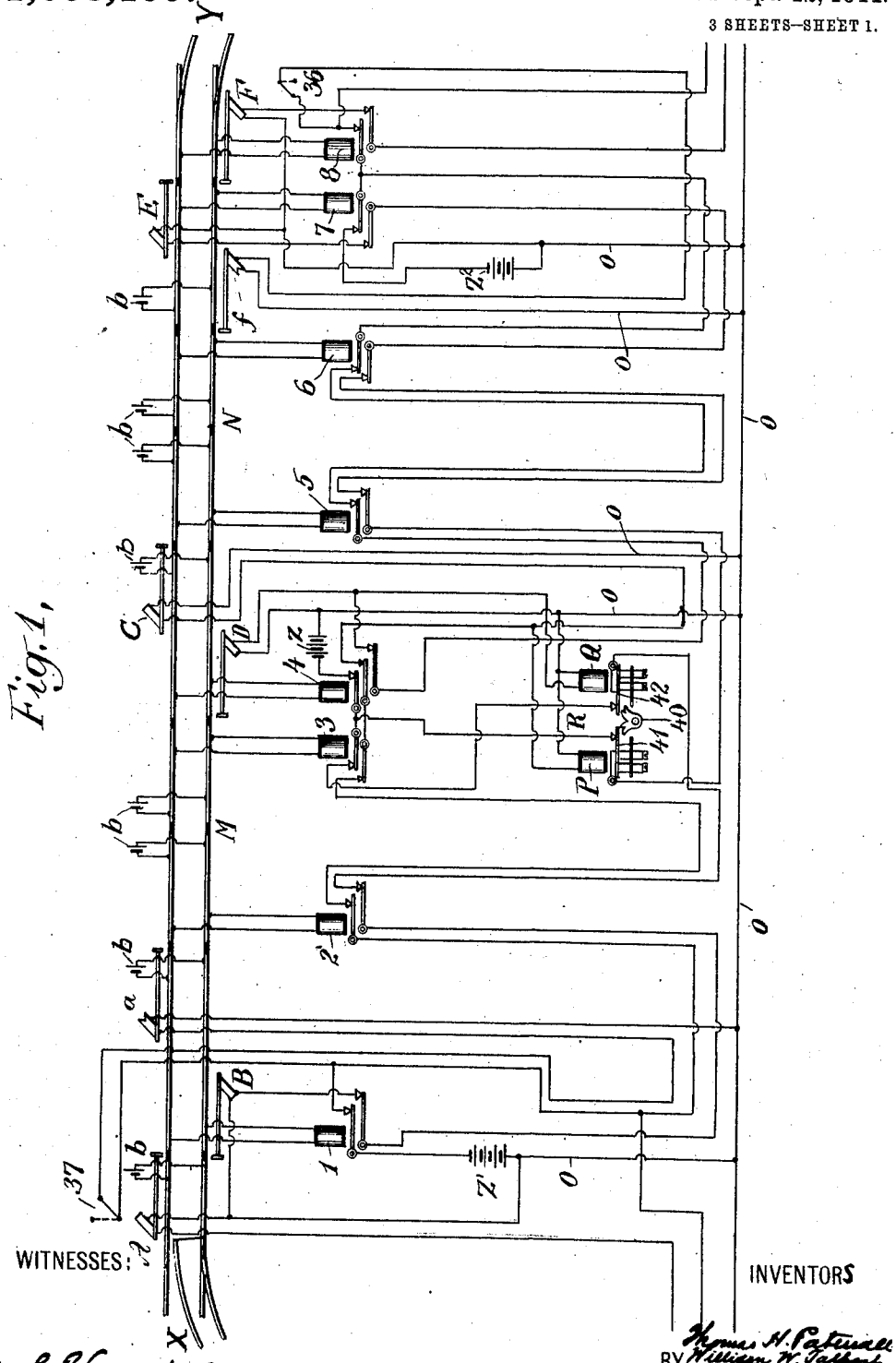
RAILWAY SIGNALING SYSTEM.

APPLICATION FILED DEC. 8, 1910.

1,003,199. Patented Sept. 12, 1911.

3 SHEETS—SHEET 1.

Fig. 1.



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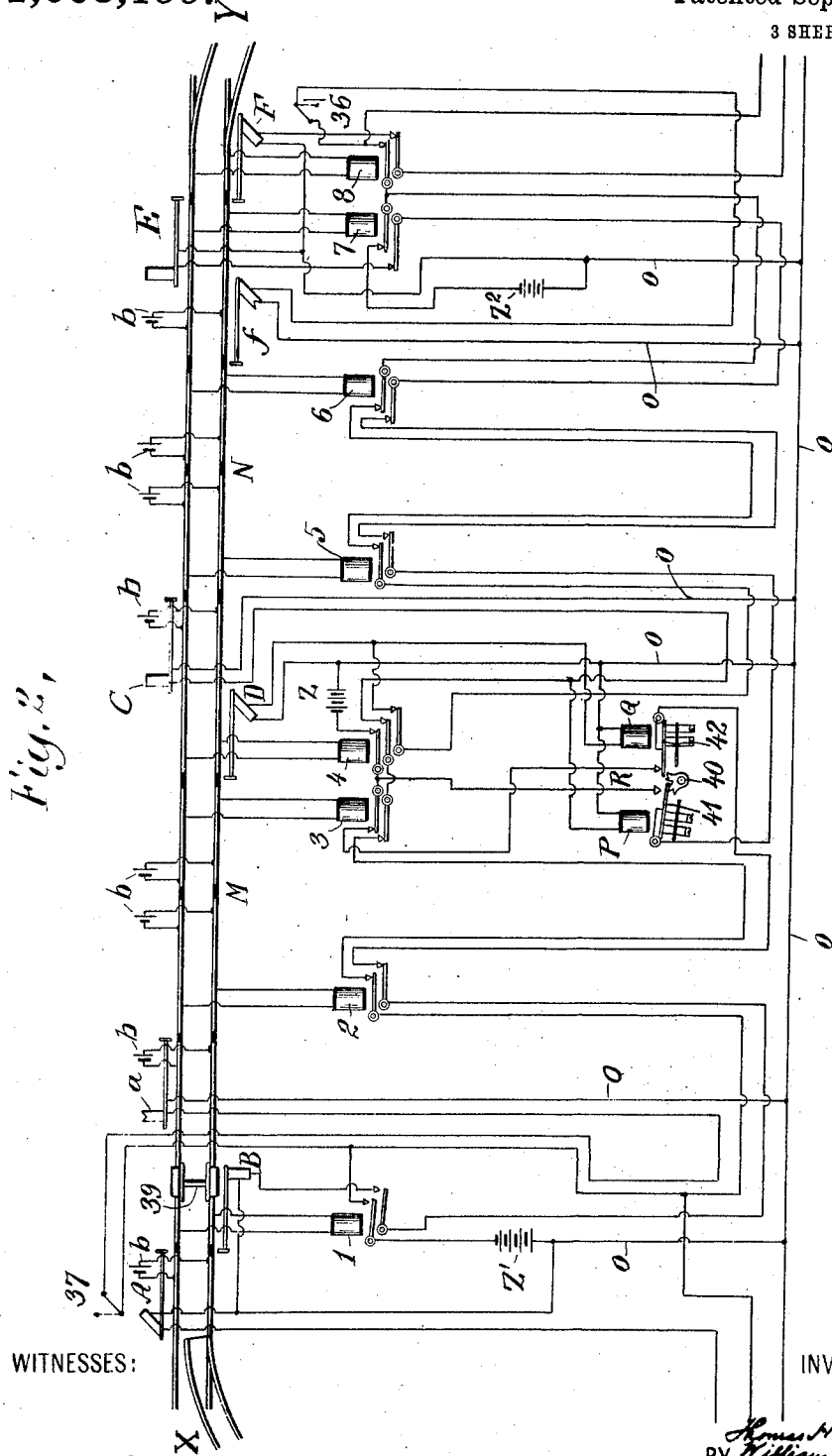
3 SHEETS—SHEET 2.

Fig. 2.



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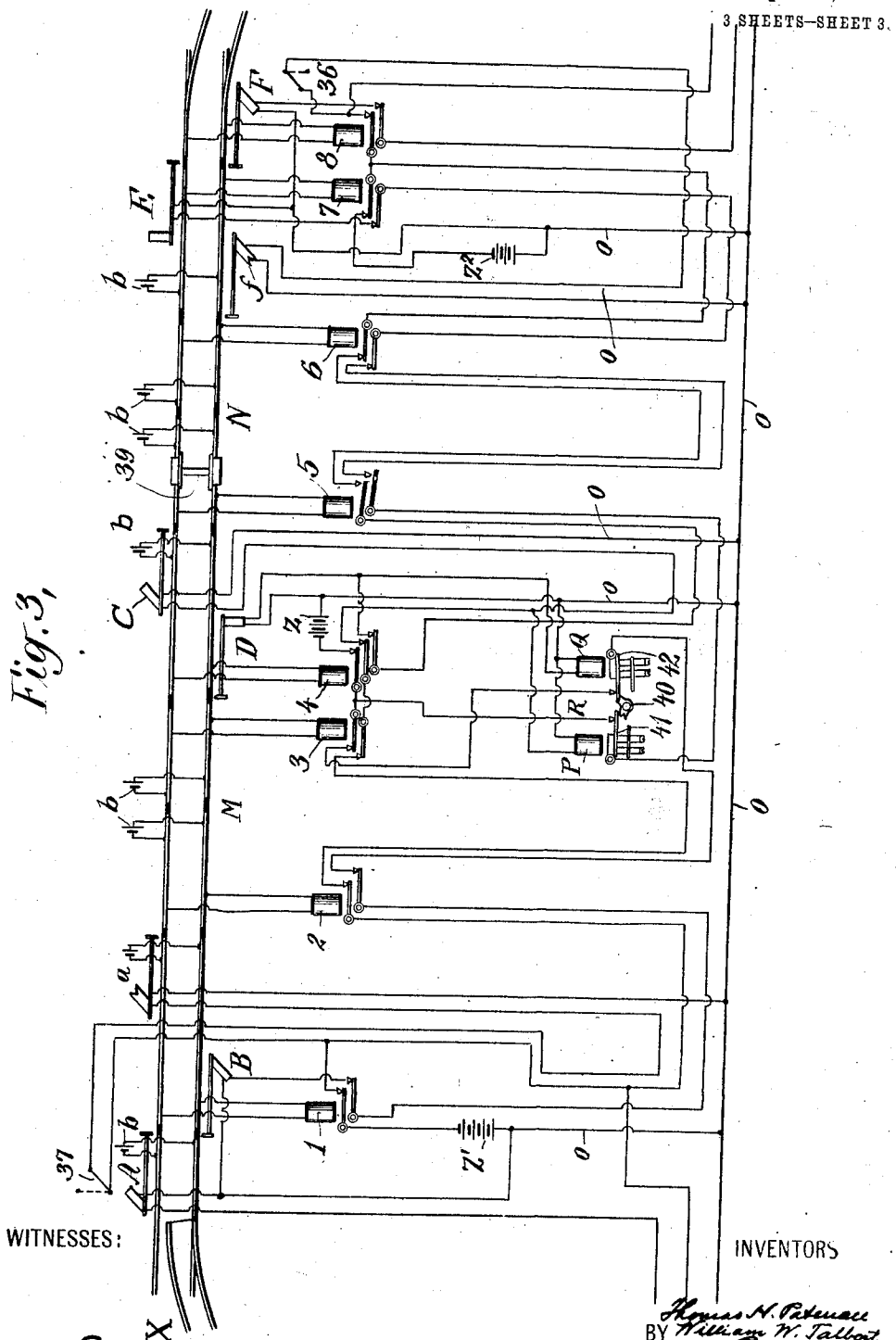

Fig. 3.

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UNITED STATES PATENT OFFICE.

THOMAS H. PATENALL, OF WILKINSBURG, PENNSYLVANIA, AND WILLIAM W. TALBERT, OF CHICAGO, ILLINOIS, ASSIGNORS TO THE UNION SWITCH & SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

RAILWAY SIGNALING SYSTEM.

1,003,199. Specification of Letters Patent. Patented Sept. 12, 1911.

Application filed December 8, 1910. Serial No. 596,378.

To all whom it may concern:

Be it known that we, THOMAS H. PATENALL, a citizen of the United States, and resident of the borough of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, and WILLIAM W. TALBERT, a citizen of the United States, and resident of the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Railway Signaling Systems, of which the following is a specification.

Our invention relates to automatic signaling systems for single track railways. In the application of our invention, the railway will be divided into block sections of any desired length and each block-section will be sub-divided into any desired number of "cut sections." Each block section will be protected by signals arranged to govern traffic in either direction through the block section. The circuits for the signals will be arranged so that the movement of a train into the block-section in one direction places at danger the signal governing traffic into the block-section in the opposite direction, and this signal will be held at danger until the train leaves the block-section. The circuits, however, are arranged so that as the train proceeds through the block-section, the signals at a predetermined distance in its rear will be moved to the clear position to permit of trains following each other through the block section as in double track systems.

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

In the accompanying drawings, Figure 1 is a diagrammatic view showing a block-section of a single track railway equipped with signals to control traffic in either direction and embodying our invention. Figs. 2 and 3 are views similar to Fig. 1, but showing the positions assumed by parts of the system when affected by the presence of a train in various parts of the block section.

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

Referring to Fig. 1, we have here shown a block section of a single track railway between two sidings X and Y. In this block section, A, C and E are railway signals controlling traffic through the section from Y to X; and B, D and F are signals controlling traffic through the section from X to Y. *a* designates a "distant" signal controlled by a circuit controller 37 operated by the signal A, and *f* designates a distant signal similarly controlled by signal F. The block section X—Y is divided into a series of cut-sections each of which is provided with a track circuit for which *b*, *b*, etc. are sources of current, herein shown as being batteries, and 1, 2, 3, etc. are track relays. R designates an "interlocking" relay which comprises two magnets P and Q, an interlocking lever 40, and two armatures 41 and 42. A relay of this type is set forth in United States Letters Patent No. 799,452 granted to William W. Coleman, on September 12, 1905.

The operation of this system may be described as follows: Referring now to Fig. 2 and assuming that a train 39 enters the block section from the siding X, its movement into cut-section B *a* shunts relay 1, thereby placing at danger signals B, C, E and *a*. The shunting of relay 1 opens directly the controlling circuit for signal B, which is from battery Z through the armatures of relays 4 and 3, armature 42 of interlocking relay R, armatures of relays 2 and 1, signal B, common wire O to battery Z. The shunting of relay 1 also opens directly the controlling circuit for signal C which is as follows: from battery Z′ through the armatures of relays 1, 2, 3 and 4, signal C, common wire O to battery Z′. A branch of this circuit also includes the winding of magnet P, which magnet is therefore deënergized by the shunting of relay 1, allowing its armature 41 to open. The opening of this armature 41 opens the controlling circuit for signal E, which is from battery Z through the armature of relay 4, armature 41 of magnet P, armatures of relays 5, 6, and 7, signal E, common wire O to battery Z.

If there is a preceding block section similar to the block section X—Y, the shunting of relay 1 will hold at danger a signal in this preceding block section which corresponds to signal F in block-section X—Y and which we will designate as signal F′.

The controlling circuit for this signal is from battery Z′ through the armature of relay 1, armature of relay 8 of the preceding block section, signal F′, common wire O to battery Z′. The shunting of relay 1 also moves the distant signal *a* to caution position by opening its controlling circuit which is from battery Z′ through circuit controller 37, signal *a*, common wire O to battery Z′.

As the train proceeds from cut-section A—*a* into cut-section *a* M, the closing of relay 1 closes the controlling circuits for signals F′ and *a* which are therefore permitted to move to their clear positions. The presence of the train in cut-section *a*—M shunts relay 2, but this causes no change in the circuits in the block-section shown in Fig. 2 other than closing the circuit for signal *a*, for the reason that the armature contacts of this relay control only the same circuits as are controlled by relay 1 except that for signal *a*.

The movement of the train from cut-section *a*—M into cut-section M—D shunts relay 3 and permits relay 2 to close, but this causes no change in the system since these two relays control the same circuits. As the train proceeds from cut-section M—D into cut-section D—C, the shunting of relay 4 opens the controlling circuit for signal D, which is from battery Z^2 through the armatures of relays 7, 6, 5 and 4, signal D, common wire O to battery Z^2. A branch of this circuit includes the winding of magnet Q of the interlocking relay R, which therefore becomes deënergized, but the armature 42 of this magnet is not permitted to open its contact because armature 41 is already open. The shunting of relay 4 also holds open the circuits as hereinbefore described for signals B, C and E.

Referring now to Fig. 3, as the train 39 proceeds from cut-section D—C into cut-section C—N, the closing of relay 4 closes the controlling circuit for signal B, which is therefore permitted to move to its clear position. Hence the signal B moves to clear as soon as the train passes signal C, and another train may enter the block section from the siding X. The closing of relay 4 also closes the controlling circuit for signal C, which then moves to its clear position, and it also closes the branch circuit through the winding of magnet P, which therefore closes its armature 41. The closing of this armature 41 closes the controlling circuit for signal E at this point, but the circuit is held open by the shunting of relay 5, due to the presence of the train in cut-section C—N. It will be seen, therefore, that as the train passes signal C, the control of signal E is transferred from the interlocking relay R to the track relays 5, 6 and 7. The shunting of relay 5 holds open the controlling circuit for signal D, as well as the energizing circuit for magnet Q. As the train proceeds into cut-section N—*f*, the shunting of relay 6 and the closing of relay 5 cause no changes in the system for the reason that the circuits controlled by these two relays are the same. The shunting of relay 7 by the movement of the train into cut-section *f*—F, moves the distant signal *f* to danger by opening its controlling circuit, which is from battery Z^2 through the armature of relays 7 and 8, circuit controller 36, signal *f*, to battery Z^2. The shunting of relay 7 causes no further changes in the circuits shown in the drawings, but it opens the controlling circuit for a signal in the next succeeding block section which corresponds to signal A in the block-section shown in the drawings, and which I will designate as signal A′. The circuit for this signal is from battery Z^2 through the armature of relays 7 and 8, signal A′ or the next succeeding block-section, common wire O to battery Z^2.

The movement of the train past signal F shunts relay 8, which holds open the controlling circuit for signal A′ last described. The closing of relay 7 as the train leaves cut-section *f*—F closes the controlling circuits for signals D and E, and also closes the branch circuit which includes the winding of magnet Q, thereby energizing this magnet. Unless a following train has entered the block section from siding X the entire block section assumes its normal condition shown in Fig. 1, except that the signal F remains in the danger position until the train passes the point *a* in the next succeeding block section.

The movement of a train in the opposite direction through the block section would have a similar effect on the system. In this case, the shunting of track relay 7 would open the circuit for magnet Q, and this latter magnet would hold signal B at danger until the train gained direct control of the circuit for signal B by the shunting of track relay 4 when it reaches cut section C—D. As the train passes out of cut-section C—D the controlling circuit for signal E would be closed, moving signal E to its clear position and permitting a following train to enter the block section. A further description of the operation of the system for a movement in this direction is unnecessary.

Having thus described our invention, what we claim is:

1. In a railway signaling system, a block section, a plurality of track circuits for said block section, a signal located adjacent each end of the block section each for governing traffic into the block section from one end, a line relay for each signal and controlled by track circuits adjacent the end of the block section opposite to the signal, a signal circuit for each of said signals and controlled by the said line relay for the signal,

and means operated by each line relay for rendering the other line relay inoperative in its control of its signal.

2. In a railway signaling system, a block section, a plurality of track circuits for said block section, a signal located adjacent each end of the block section each for governing traffic into the block section from one end, a line relay for each signal and controlled by track circuits adjacent the end of the block section opposite to the signal, a signal circuit for each signal and controlled by the said line relay for the signal and by track circuits adjacent the end of the block section at which the signal is located.

3. In a railway signaling system, a block section, a plurality of track circuits for said block section, a signal located adjacent each end of the block section each for governing traffic into the block section from one end, a line relay for each signal and controlled by track circuits adjacent the end of the block section opposite to the signal, a signal circuit for each signal and controlled by the said line relay for the signal and by track circuits adjacent the end of the block section at which the signal is located, and means operated by each line relay for rendering the other line relay inoperative in its control of its signal circuit.

4. In a railway signaling system, a block section, a plurality of track circuits for said block section, a signal located adjacent each end of the block section each for governing traffic into the block section from one end, a line relay for each signal and controlled by track circuits adjacent the end of the block section opposite to the signal, a signal circuit for each signal and controlled by the said line relay for the signal and by track circuits adjacent the end of the block section at which the signal is located, and means for interlocking the said line relays.

5. In a railway signaling system, a block section, a plurality of track circuits for said block section, a signal located adjacent each end of the block section each for governing traffic into the block section from one end, a signal circuit for each signal and controlled by track circuits adjacent the end of the block section at which the signal is located, controlling means included in each signal circuit and controlled by track circuits adjacent the end of the block section opposite to the signal, and means operated by the controlling means of one circuit for rendering the controlling means of the other circuit inoperative in its control of its signal.

6. In a railway signaling system, a block section, a plurality of track circuits for said block section, a signal located adjacent each end of the block section each for governing traffic into the block section from one end, a line relay for each signal and controlled by track circuits adjacent the end of the block section opposite to the signal, a signal circuit for each signal and controlled by the said line relay for the signal and by track circuits adjacent the end of the block section at which the signal is located, and means operated by the line relay first affected by the entrance of train upon the block section from either end for rendering the other line relay inoperative in its control of its signal.

7. In a railway signaling system, a block section, a plurality of track circuits for said block section, a signal located adjacent each end of the block section each for governing traffic into the block section from one end, a line relay for each signal and controlled by a track circuit adjacent the end of the block section opposite to the signal, a signal circuit for each signal controlled by the said relay for the signal and by a track circuit adjacent the end of the block section at which the signal is located, and means operated by each line relay for rendering the other line relay inoperative in its control of its signal.

8. In a railway signaling system, a block section, a plurality of track circuits for said block section, a signal located adjacent each end of the block section each for governing traffic into the block section from one direction, a line relay for each of said signals and controlled by track circuits adjacent the end of the block section opposite to the signal, a signal circuit for each of said signals and controlled by the said line relay for the signal and by track circuits adjacent the end of the block section at which the signal is located; and a plurality of intermediate signals located in the block section, part of them for governing traffic through the block section in one direction and part of them for the other direction, each of said intermediate signals being controlled by the track circuits for the portion of the block section over which it governs traffic.

9. In a railway signaling system, a block section, a plurality of track circuits for said block section, a signal located adjacent each end of the block section each for governing traffic into the block section from one direction, a line relay for each of said signals and controlled by track circuits adjacent the end of the block section opposite to the signal, a signal circuit for each of said signals and controlled by the said line relay for the signal and by track circuits adjacent the end of the block section at which the signal is located, means operated by each line relay for rendering the other line relay inoperative in its control of its signal; and a plurality of intermediate signals located in the block section, part of them for governing traffic through the block section in one direction and part of them for the other direction, each of said intermediate signals

being controlled by the track circuits for the portion of the block section over which it governs traffic.

10. In a railway signaling system, a block section, a plurality of track circuits for said block section, a signal located adjacent each end of the block section each for governing traffic into the block section from one end, a line relay for each signal and controlled by track circuits adjacent the end of the block section opposite to the signal, a signal circuit for each signal and controlled by the said line relay for the signal and by track circuits adjacent the end of the block section at which the signal is located, and means operated by one line relay for rendering the other line relay inoperative in its control of its signal circuit.

In testimony whereof, we have signed our names to this specification, in the presence of the subscribed witnesses.

THOMAS H. PATENALL.
WILLIAM W. TALBERT.

Witnesses as to Thomas H. Patenall:
FRANK J. PILLSBURY,
A. L. VENCILL.
Witnesses as to William W. Talbert:
G. T. CAREY,
JENNIE L. FISKE.