E. B. SAMUELS.

ELECTRIC BLOCK RAILWAY SIGNAL.

APPLICATION FILED OCT. 22, 1907.

926,022. Patented June 22, 1909.

4 SHEETS—SHEET 1.

Fig. 1.

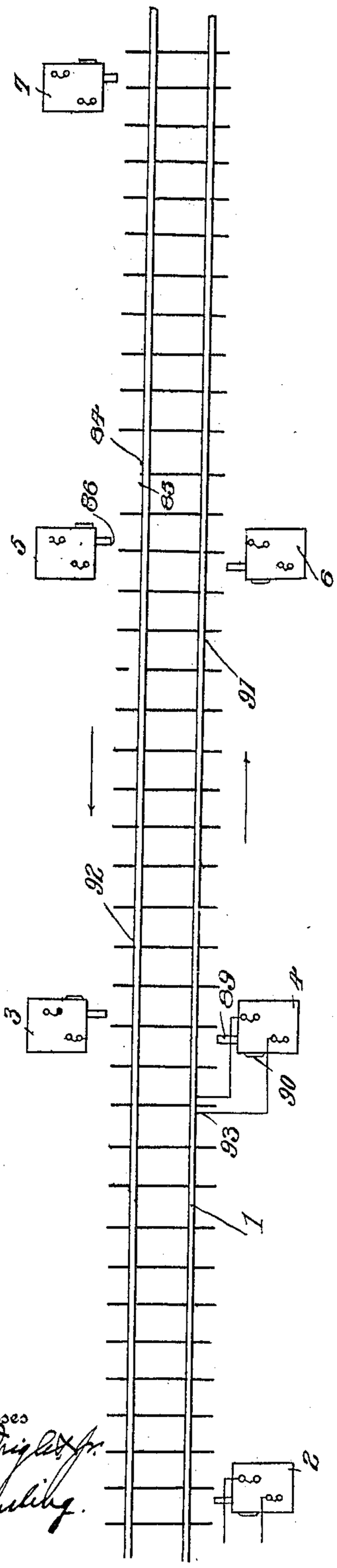
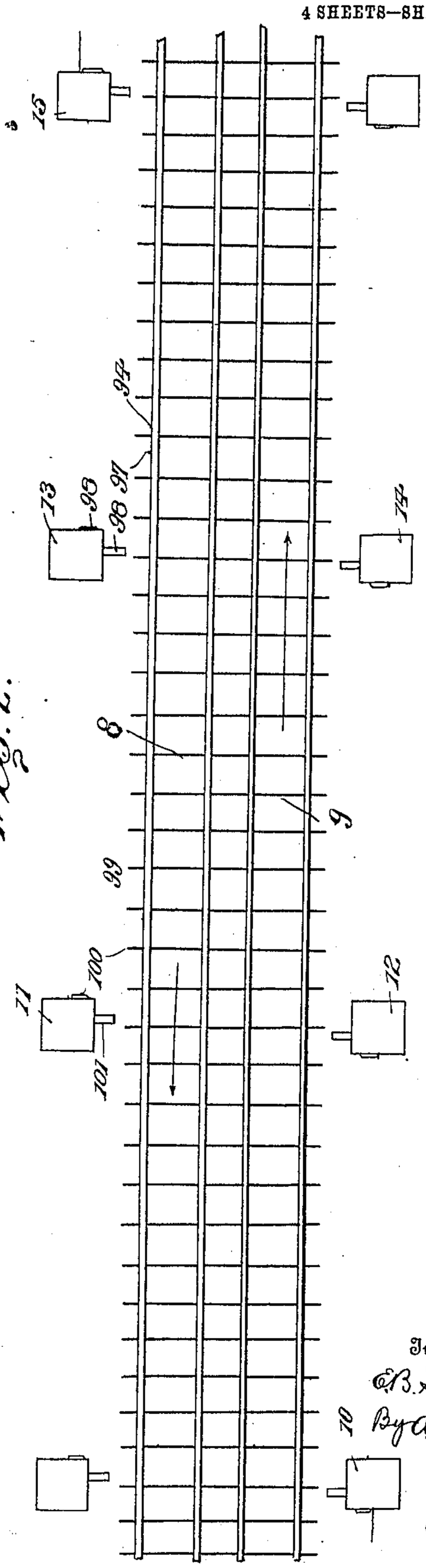



Fig. 2.




Witnesses

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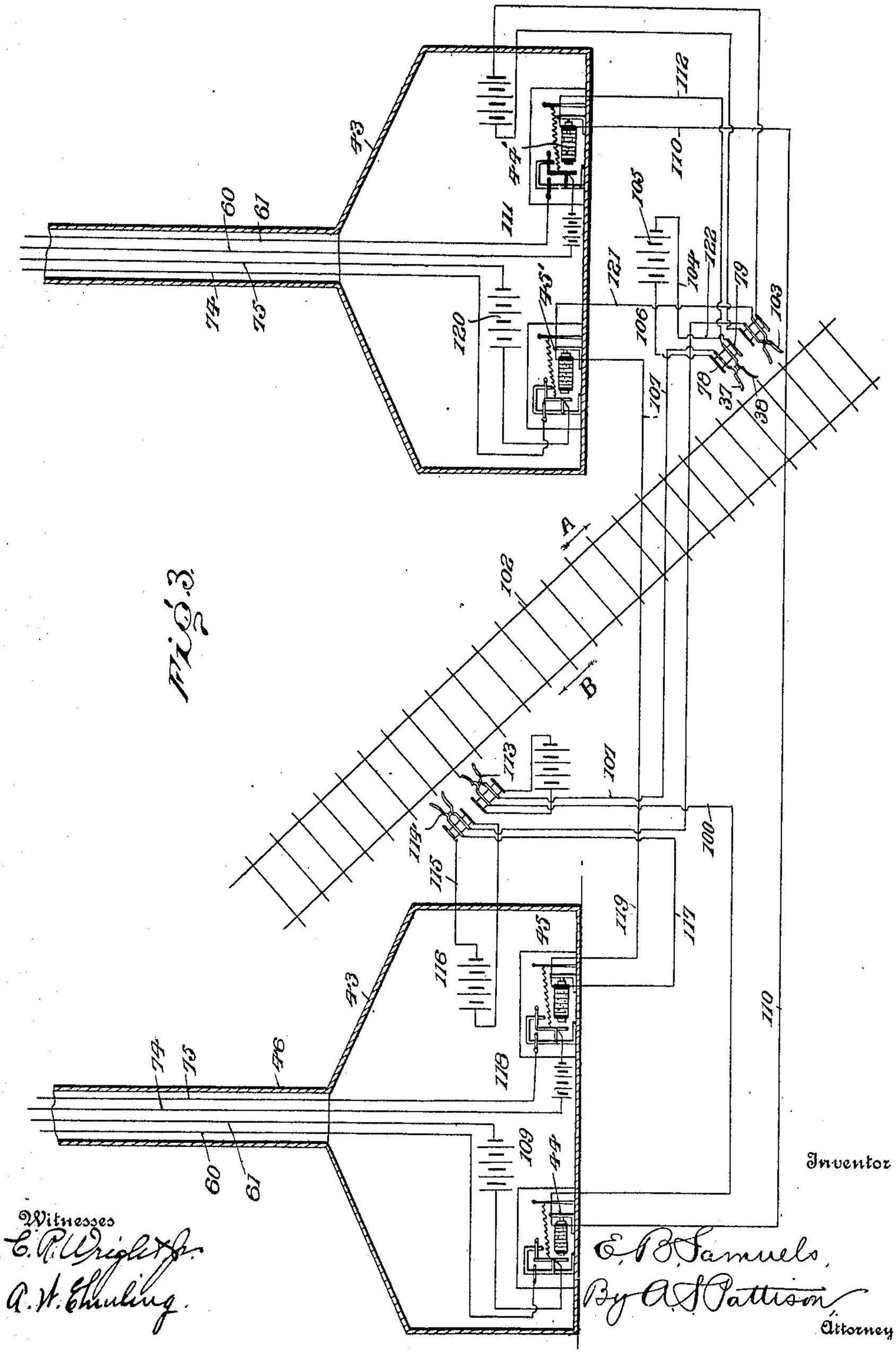
4 SHEETS—SHEET 2.

Fig. 3.

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4 SHEETS—SHEET 3.

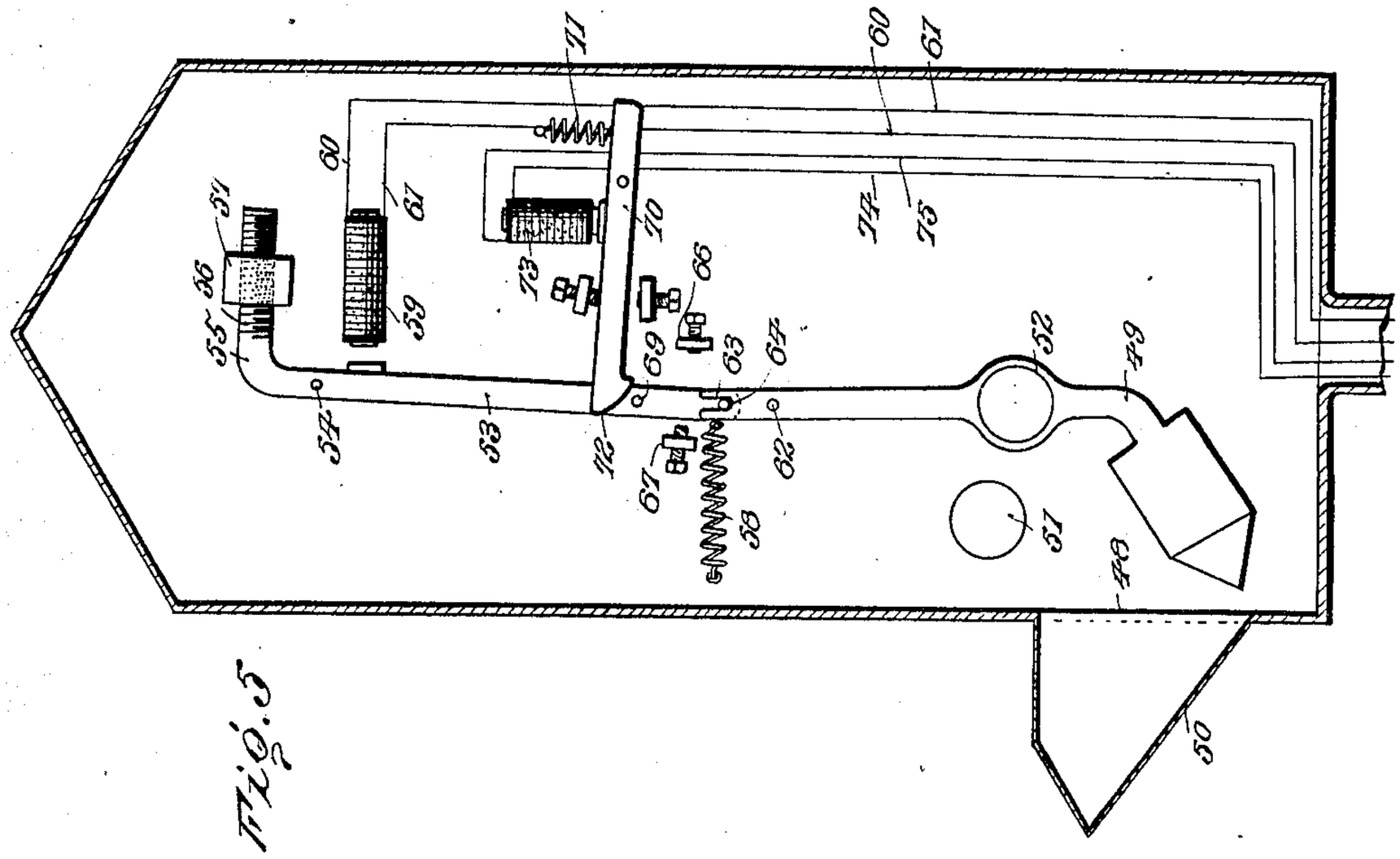

Fig. 3.

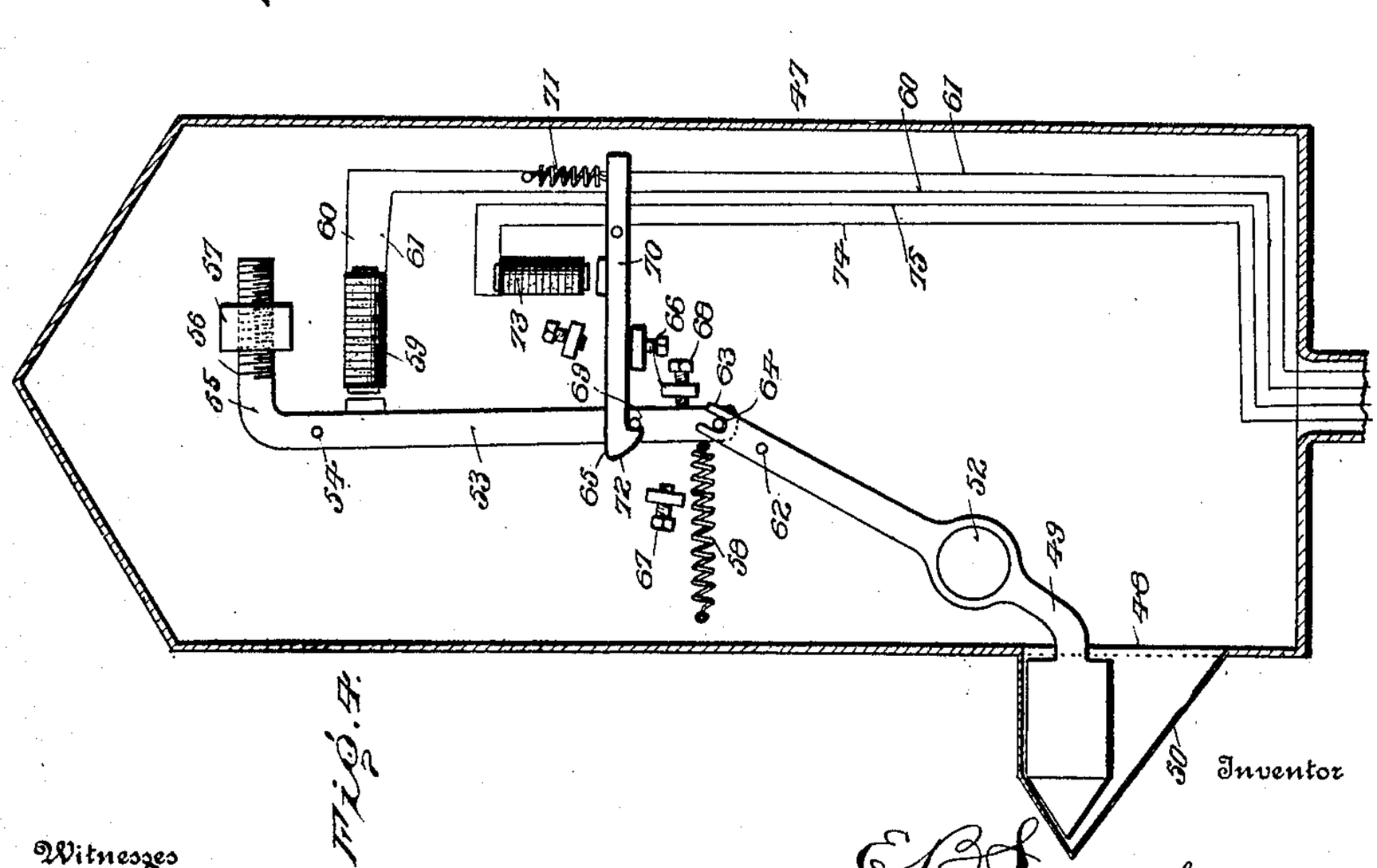

Fig. 4.

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4 SHEETS—SHEET 4.

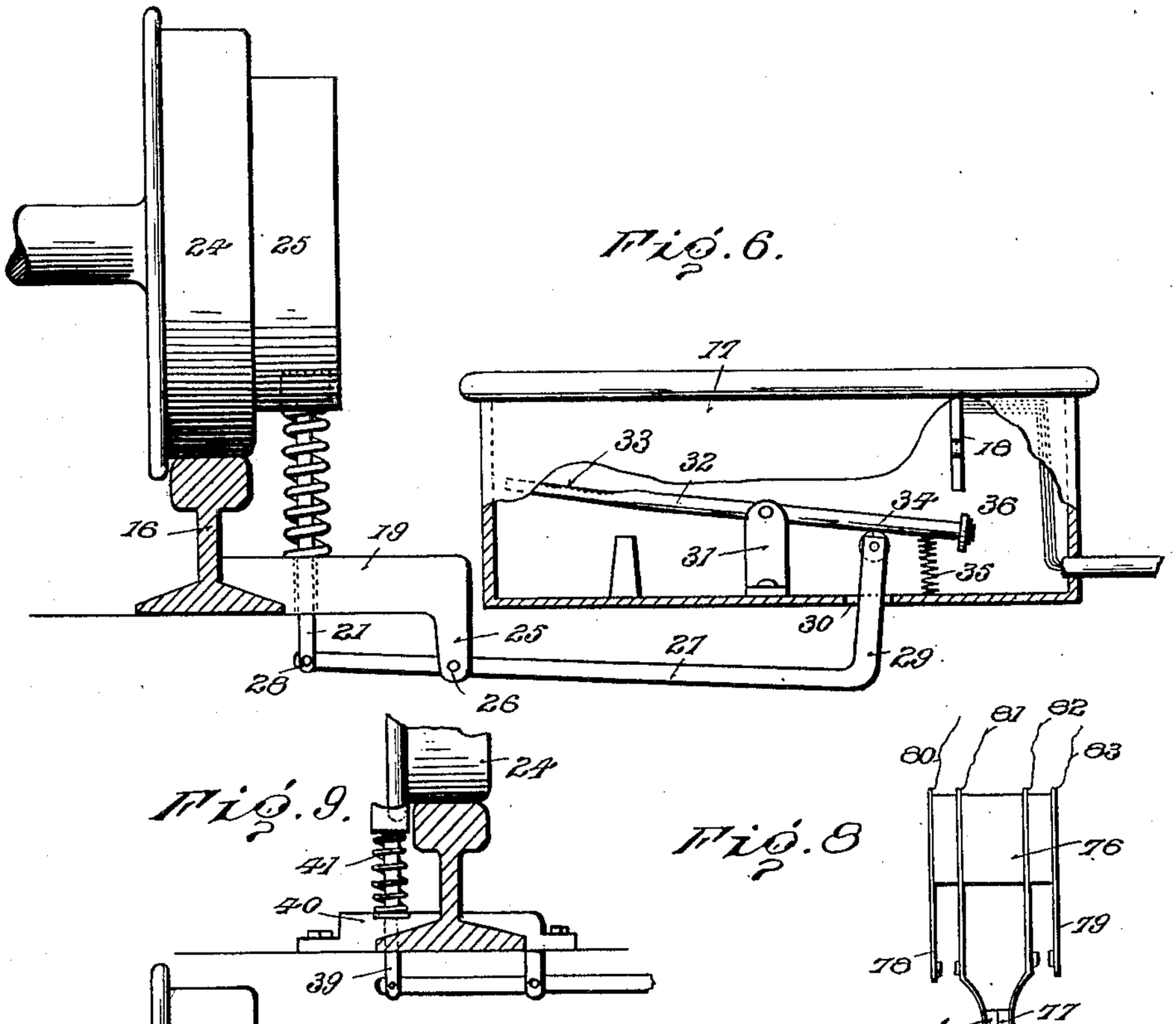


Fig. 6.




Fig. 9.




Fig. 8




Fig. 7.

Witnesses

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# UNITED STATES PATENT OFFICE.

EMORY B. SAMUELS, OF DEATSVILLE, KENTUCKY.

## ELECTRIC BLOCK RAILWAY-SIGNAL.

No. 926,022. Specification of Letters Patent. Patented June 22, 1909.

Application filed October 22, 1907. Serial No. 398,674.

*To all whom it may concern:*

Be it known that I, EMORY B. SAMUELS, a citizen of the United States, residing at Deatsville, in the county of Nelson and State of Kentucky, have invented certain new and useful Improvements in Electric Block Railway-Signals, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to improvements in electric block railway signals, and pertains more particularly to that class of signals operated by the moving train.

The object of my invention is to provide a railway block signal apparatus whereby the train automatically sets the danger signal ahead, and behind, on single tracks when it passes into a block, and automatically releases said signal when passing out of the block. In double track systems the train sets the signal behind only as it enters the block, as the trains are all traveling in one direction on each track, and thus there is no liability of a head-on collision.

My invention consists in the construction and arrangement of parts to accomplish the results hereinafter set forth.

In the accompanying drawings, Figure 1, is a plan view of a single track showing the general arrangement of the signal towers and release and set levers. Fig. 2, is a plan view of a double track showing the arrangement of the signal towers and release and set levers. Fig. 3, is a diagrammatical view of a single track showing two signal towers and their wiring and arrangement for operating the signals in the tower. Fig. 4, is a sectional view of the signal tower showing the signal set for danger. Fig. 5, is a sectional view of the signal tower similar to Fig. 4, and showing the signal released showing a clear track. Fig. 6, is a side elevation of the track lever operating mechanism. Fig. 7, is a side elevation similar to Fig. 6, showing the lever being depressed by the passing train. Fig. 8, is an enlarged side elevation of the circuit closing mechanism operated by the track levers. Fig. 9, is a side elevation of a modification showing the track levers operated by the flange of the wheel of the passing train.

Referring now to the drawings, 1 represents a single track equipped with my block signal systems, and 2, 3, 4, 5, 6, and 7 represent the signal towers arranged along the track for illustrating the operation of the several signals, as will be hereinafter more fully described.

8 and 9 represent double tracks equipped with my signal system, and 10, 11, 12, 13, 14, and 15 represent the several signal towers and their arrangement along the track for illustrating the general operation of the signals in the towers operated by the moving train, all of which will be hereinafter more fully described.

The outside rail of the track is indicated by 16 and located adjacent thereto is a box 17 which carries the circuit closer 18. Adjacent the rail 16 between the same and the box 17 is a plate 19 which may be secured to the rail or the tie, as desired, as the means of securing this bar forms no part of my invention. The plate 19 is provided with an opening 20 through which the bar 21 passes, and surrounding said bar 21 above the plate is a coiled spring 22 which has its upper end bearing against an enlarged portion 23 of the bar 21, and normally holding said bar in its upward position. The car wheel 24 is provided with an extension 25 which is adapted to engage the enlarged portion 23 of the bar 21 and depress the same. The plate 19 is provided with a downwardly-extending arm 25 to which is pivoted at 26 the lever 27 which has its outer end pivoted at 28 to the bar 21. The opposite end of the lever 27 is turned upwardly at 29 and passes through an opening 30 in the box 17. The lower end of the box is provided with an upwardly-extending arm 31 to which is intermediately pivoted the lever 32. One end of said lever is provided with a flattened portion 33 whereby the lever may be operated by the hand or foot. Adjacent the opposite end of the lever 32 the upward-turned portion 29 of the lever 27 is provided with a roller 34 which is directly below the lever 32, and engages the same and forces it upwardly for closing the circuit. The extreme outer end of the lever 32 is provided with a roller 36 which is made of some non-conducting material, and is adapted to pass between the spring arms 37 and 38 of the circuit closer, as shown in Fig. 7, whereby the circuits are closed, operating the relays which in turn close the signal circuits, whereby the signals are either set or released.

In Fig. 9, instead of providing the wheel with the extension 25, the lever 27 is extended under the rail 16 and has connected thereto the rod 39 which extends through the

base of the rail and through the plate 40, and extends up along the side of the rail, and is normally held in a position slightly above the tread of the rail by the spring 41, whereby the said rod 39 is depressed by the flange 42 of the wheel, although this is not applicant's preferred form of operating the signal.

The signal towers are formed of an enlarged base 43, in which are mounted the relays 44 and 45, which control the local circuits of the signal operating apparatus. The base 43 has attached at its upper end the hollow stem portion 46 which carries at its upper end, the enlarged box-like portion 47 carrying the signal, which I will now proceed to describe.

The signal tower proper 47 is provided on the side adjacent the track with an opening 48 through which the semaphore 49 is adapted to extend when the signal is set for danger in the day time, and the said opening may be surrounded with a casing 50 which protects the semaphore when it is held out in danger position. The tower is also provided with an opening 51 back of which is arranged a lamp for displaying the proper signal at night. The opening for the night signal is on the side of the tower so that the engineer may readily see said signal. The semaphore is provided with a red glass plate 52 which works between the opening and the lamp, whereby when the semaphore is set for danger at night the red signal will be displayed, and when the semaphore is released the usual white signal is displayed to indicate that the track is clear.

The semaphore operating mechanism is all inclosed within the tower 47, and consists of a lever 53 pivoted at 54 and having the outwardly-turned end 55 which is screw-threaded at 56 and upon which is screwed the weight 57, whereby the lower end of the lever is normally held in the position shown in Fig. 5. In order to further assist in holding said lever in the position shown I provide a spring 58 which is attached to the lower end of the lever, and has its opposite end attached to a stationary part of the tower. Adjacent the lever below its pivotal connection 54 is a magnet 59 which is energized through the local circuit formed of the wires 60 and 61, and thus draws the lever in the position shown in Fig. 4. The semaphore is pivoted adjacent its upper end, as indicated at 62, and the upper end thereof is provided with the slotted portion 63 which receives a pin 64 carried by the lower end of the lever 53, whereby when the lever is swung inwardly the semaphore is moved outwardly displaying the same by day or at night, covering the opening 51 with the red plate of glass and displaying the red light. In order to limit the inward and outward movement of the lever 53 I provide the studs 65 and 66 with thumbscrews 67 and 68, whereby the throw of the lever may be regulated in both directions, and thus the throw of the semaphore may be regulated for causing it to assume the proper position to be properly displayed and properly cover the opening 51.

In order to lock the signal in the set position I provide the lever 53 with a pin 69 over which the pivoted catch 70 is adapted to hook. The said catch is normally held in the position shown in Fig. 4 by the spring 11. When the lever 53 is drawn inwardly by the magnet 59 the pin 69 engages the beveled end 72 of the catch, forcing it upwardly and allowing the hook to catch over the pin, whereby the signal is locked in its set position.

Arranged above the catch 70 is a magnet 73 which is energized through the wires 74 and 75 of the local circuit, and whereby the latch is released, allowing the lever 53 to be drawn over in the position shown in Fig. 5 by the spring 58 and the weight 57. The local circuit controlling magnet 73 is closed by the relays which are operated through the circuits and closed by the track levers, which will be hereinafter more fully described.

The circuit closers 76, as before stated, are composed of the spring arms 37 and 38, which carry the contact points 77 and 77′ which are normally in contact and complete the metallic circuit through the two circuit closers, and the two relays that are connected together. The circuit closer is provided with the arms 78 and 79. The arms 37, 38, 78 and 79 are all embedded in a block of insulating material and have connected thereto the wires 80, 81, 82 and 83 which lead to the relays in the two signal towers, all of which I will now proceed to describe.

As shown in Fig. 1 the signal towers are arranged on opposite sides of the track, the arrows indicating the direction of travel of the trains. A train traveling from the right toward the left engages the release lever 84, and the signal having been previously released by another train, has no effect upon the signal. The train next engages the set lever 85 which sets the signal in the tower 5, as appearing for danger by the semaphore 86 by day, or by the light 97 by night, so that a danger signal is displayed from the direction of travel of the train. The set lever also, through the wires 88, sets the danger signal at the tower 4, as indicated at 89 and 90, so as to prevent a train from entering the block from the front. The release and set levers, as shown at 84 and 85, are far enough in advance of the tower 5 so that the engineer may see that the signal is operated by his train and therefore preventing him from entering the block if the signal is not operated by his train. The train engages the release lever 91 which releases the signal in tower 7. As the train continues to travel through the

block as it nears the tower 3 it engages the set lever 92 which sets the signal in the towers 3 and 2. After the train passes the tower 4 it engages the release lever 93 which releases the signals in the towers 4 and 5 and gives a clear track. The operation of the towers is the same when the train is approaching in the opposite direction.

In Fig. 2 the signals are simply set and released in separate towers, owing to the double track system. The train being on the upper track between the towers 13 and 15, as it approaches the tower 13 it engages the release 94 which releases the signals 95 and 96 in the tower 15. It next engages the set lever 97 which sets the signals 98 in the tower 13 and thus prevents the train from entering the block between the towers 11 and 13 until the train has passed the release lever 99, and the set lever 100, which sets the signal 101 in the tower 11.

I will now proceed to describe the relays and the local circuits, as shown in Fig. 3. The track is indicated at 102, and the arrows A and B at the sides indicate the two directions of travel of the trains. The signals are set for a clear track; that is, they are released, and the train comes along in the direction of the arrow B—it would first operate the release lever or closer, as indicated at 103, but the signal being in the position shown in Fig. 5, will not be operated. The continued travel of the train operates the set levers which close the circuits through the spring arms 38 and through the plate 79 through the wire 104 to the battery 105, and through the wire 106 to the plate 78, and through the spring arm 37 into the wire 107. The circuit then passes through the wire 107 to the circuit closer 113 of the release lever back through the wire 100 to the relay 44, which closes the local circuit 109 and through the wires 60 and 61 sets the signal in the tower ahead as heretofore described. The circuit passes from the relay 44 through the wire 110 to the relay 44′, which closes local circuit 111, which through the wires 60 and 61 in the tower just passes, and sets the signal in the position shown in Fig. 4. The circuit then passes from the relay 44′ through the wire 112 back to the spring arm 38 and the circuit is completed. All of this takes place instantaneously when the rod 21 is depressed by the passing train, and the member 36 is spreading the arms 37 and 38. By this construction set forth it will be seen that the signal is set in two towers, so as to prevent a head-on or rear-end collision. The train traveling next strikes the set lever 113 for operating signal when the train is traveling in the direction indicated by the arrow A, but when the train is traveling in the direction indicated by arrow B the signals are set and thus they are not affected by passing over the levers 113. The train next passes over the release 114 which through the wire 115 closes the circuit to the battery 116, and from the battery the circuit passes back to the release 114 and out through the wire 117 to the relay 45 which closes the local circuit 118, and through the wires 74 and 75, which release the signal as shown in Fig. 5. The circuit passes through the wire 119 to the relay 45 which closes the local circuit 120 which releases the other signal. The circuit then passes from the relay through the wire 121 to the circuit closer 103 and from there through the wire 122 to the circuit closer 114. The operation is the same when the train is traveling in the direction indicated by arrow A, and thus a signal is set in front and behind the train no matter which way it is traveling.

Having thus described my invention, what I claim and desire to secure by Letters Patent, is:—

1. The combination with a railway track, signal towers arranged in pairs along the track, electrically-operated signals within the towers, two circuit closures opposite each tower, said closures composed of end plates insulated from two spring arms, said arms insulated from each other, but having contact points normally engaging each other, wires connected to said end plates and spring arms and connected to the signal operating mechanism through the closures of the other tower, and means operated by the train for spreading the spring arms and causing a contact between the spring arms and plates.

2. The combination with a railway track, signal towers arranged in pairs along the track, signals within the towers, setting and releasing mechanism within the towers, two circuit closures opposite each tower, two circuits connecting the signal setting and release mechanism and the circuit closures, one circuit normally open and the other circuit normally closed, and means operated by the moving train for opening the closed circuit and closing the open circuit.

3. The combination with a railway track, signal towers arranged in pairs along the track, signals within the towers, setting and releasing mechanism within the towers, two circuit closures opposite each tower, two circuits connecting the closures and the setting and release mechanism, one circuit normally open and the other circuit normally closed, a lever for opening the closed circuit and closing the open circuit, and means operated by the moving train for operating said lever.

4. An electric railway signal apparatus, comprising signal towers arranged in pairs along the track, signals within said towers, electrically-operated signal-setting mechanism within the towers, electrically-operated signal-releasing mechanism within the towers, a circuit connecting the setting

mechanism of the two towers, a circuit connecting the release mechanism of the two towers, and two circuit closures in each circuit substantially as described.

5. The combination with a railway track, signal towers adjacent the track and arranged in pairs, electrically-operated signals within the tower, a local circuit within each tower for setting the signal, a local circuit within each tower for releasing the signal, circuits controlling the local circuits and circuit closures operated by the moving trains for controlling the last mentioned circuits.

6. An electric railway signal apparatus, comprising a signal tower having an opening therein, a pivoted semaphore adapted to extend through said opening, a lever connected to said semaphore, an electric magnet operating said lever for throwing the semaphore outwardly through said opening, a spring normally holding the semaphore inwardly, a catch for locking the lever in a position with the semaphore in an outward position, an electric magnet operating said catch, and means for energizing said magnets for operating the semaphore.

7. An electric railway signal comprising a tower having an opening therein, a pivoted semaphore therein and adapted to extend through the opening, said semaphore having a red glass therein adjacent the end, and adapted to extend over an opening in the tower when the semaphore is moved outwardly, and electrically-operated means for working said semaphore.

8. The combination with a railway track, signal towers adjacent the track and arranged in pairs, electrically-operated signals within the towers, a local circuit within each tower for setting the signal, a local circuit within each tower for releasing the signal, two circuit closures opposite each tower, two circuits connected to each closure and controlling the release and set mechanism within the tower, one circuit normally open and the other circuit normally closed, and means operated by the moving train for opening the normally closed circuit and closing the normally open circuit, substantially as described.

9. An electric railway signal comprising a tower having an opening therein, a pivoted semaphore therein, and adapted to extend through said opening, electrically-operated means for swinging said semaphore through the opening and electrically-controlled means for controlling said electric operating means.

10. An electric railway signal comprising a tower, a semaphore pivoted therein, a lever pivoted above the semaphore and having a loose connection therewith, a spring connected to the lower end of the lever and normally holding the semaphore in an inward or downward position, an electro magnet for drawing the lever inwardly against the tension of the spring and throwing the semaphore outwardly, a catch for holding the lever inwardly, and an electro magnet for raising said catch and releasing the lever, whereby the spring draws the semaphore upwardly.

11. An electric railway signal comprising a tower, a semaphore pivoted at its upper end within the tower, a lever pivoted at its upper end above the semaphore and having a loose connection with the upper end of the semaphore, a spring normally holding the lever outwardly and thus holding the semaphore inwardly, an electric magnet on the opposite side of the lever and adapted to draw the lever over against the tension of the spring whereby the semaphore is forced outward, a catch for engaging said lever and holding it in its inward position, an electric magnet adapted to raise said catch, and means for energizing said magnets.

12. An electric railway signal comprising a tower, having an opening therein, a semaphore pivoted at its upper end within the tower, a red glass carried by the semaphore below its pivotal connection with the tower, and adapted to cover said opening in the tower when the semaphore is swung outwardly from within the tower.

13. An electric railway signal comprising a tower, having openings in its sides at right angles to each other, a semaphore pivoted at its upper end within the tower, a red glass carried by the semaphore below its pivotal connection with the tower, and means for throwing the semaphore out through the opening in one side of the tower, whereby the glass covers the other opening.

14. The combination with a railway track, signal towers arranged in pairs along the track, signals within the towers, setting and releasing mechanism within the towers, two circuit closures opposite each tower and composed of two end plates insulated from two spring arms and said arms insulated from each other, but normally in contact with each other, a separate wire connected to each of the end plates and spring arms and connected to the signal release and set mechanism, and means for spreading the arms apart for bringing them in contact with the end plate for closing two circuits.

15. The combination with a railway track, signal towers arranged in pairs along the track, signals within the towers, setting and releasing mechanism within the towers, two circuit closures opposite each tower, said closures composed of end plates insulated from the two spring arms, and said arms insulated from each other, but having contact points normally engaging each other, wires connected to said arms and completing its circuit through the contact points, and means operated by the passing trains for spreading

the arms apart and completing the circuit through the end plate and through the normally-closed spring arms of the circuit closure of the other tower.

16. The combination with a railway track, signal towers adjacent the tracks, electrically-operated signals within the towers, local circuits within the towers for setting and releasing the signal, a metallic circuit controlling the local circuits and means operated by the train for closing the metallic circuit and releasing and setting the signal through the local circuits.

17. The combination with a railway track, signal towers adjacent the tracks, electrically-operated signals, signals within the towers, local circuits within the towers for setting and releasing the signal, metal circuits adapted to operate relays in the local circuits, and track levers for closing the different metallic circuits whereby the signals are set or released.

18. The combination with a railway track, signal towers adjacent the tracks and arranged in pairs, electrically-operated signals within the tower, a local circuit within each tower for setting the signal, a local circuit within each tower for releasing the signal, a circuit operated by the passing train for closing the local setting circuits of each tower, and a second circuit operated by the passing train for closing the local circuits of each tower.

19. An electric railway signal apparatus comprising a casing, a semaphore pivoted intermediate its ends within the casing, a lever pivoted at its upper end and having its lower end loosely connected to the upper end of the semaphore above its pivotal connection, a spring connected to the lower end of the lever and normally holding the semaphore inwardly, a magnet operating upon the lever below its pivotal connection for throwing the semaphore outward, a catch adapted to hold the lever in a position with the semaphore outwardly and a magnet for releasing said catch.

20. The combination with a railway track, signal towers arranged in pairs along the track, signals within the towers, setting and releasing mechanism within the towers, two circuit closures opposite each other, said closures composed of end plates insulated from two spring arms and said arms insulated from each other, but having contact points normally engaging each other, wires connected to said end plates and spring arms and connected to the signal-operating mechanism through the closures of the other tower of the pair, and track levers operated by the train and having an enlarged portion adapted to pass between the spring arms of the circuit closure for spreading the arms apart and causing a contact between the arms and end plates, substantially as described.

21. The combination with a railway track, signal towers arranged in pairs along the track, signals within the towers, electric setting and releasing mechanism within the towers, two circuit closures opposite each tower, said closure composed of end plates insulated from the two spring arms and said arm insulated from each other, but having contact points normally engaging each other, wires connected to said arms, and means operated by the passing trains for completing the circuit through the arms and end plates, and through the arms of the circuit closure of the other tower.

22. The combination with a railway track, signal towers arranged along the tracks in pairs, electrically operated signals within the towers, local circuits within the towers for setting and releasing the signal, metallic circuit controlling the local circuits, two circuit closures opposite each tower, said closures composed of end plates insulated from two spring arms, and said arms insulated from each other but having contact points normally engaging each other, the metallic circuit connected to the arms and end plates and completed through the closures of the other tower of the pair, and track levers operated by the train for spreading the arms apart and completing the circuit through the end plate, and through the normally closed spring arms of the circuit closure of the other tower.

23. The combination with a railway track, signal towers arranged along the track in pairs, electrically-operated signals within the towers, local circuits within the towers for setting and releasing the signals, metallic circuits controlling the local circuits, two circuit closures opposite each tower, said closures composed of end plates insulated from two insulated spring arms and said plates insulated from each other, said arms having contact points normally engaging each other, the metallic circuits connected to the arms and plates and completed through the closures of the other tower of the pair, and a track lever operated by the train and having a block of insulated material adapted to be forced between the spring arm and forcing the contact points apart, and causing the arms to engage the plates and the spring arms, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

EMORY B. SAMUELS.

Witnesses:

CHAS. T. SAMUELS,

HICKMAN STOVER.