L. JOHNSON.

RAILWAY BLOCK SIGNAL SYSTEM.

APPLICATION FILED SEPT. 15, 1909.

990,486.

Patented Apr. 25, 1911.

3 SHEETS—SHEET 1.

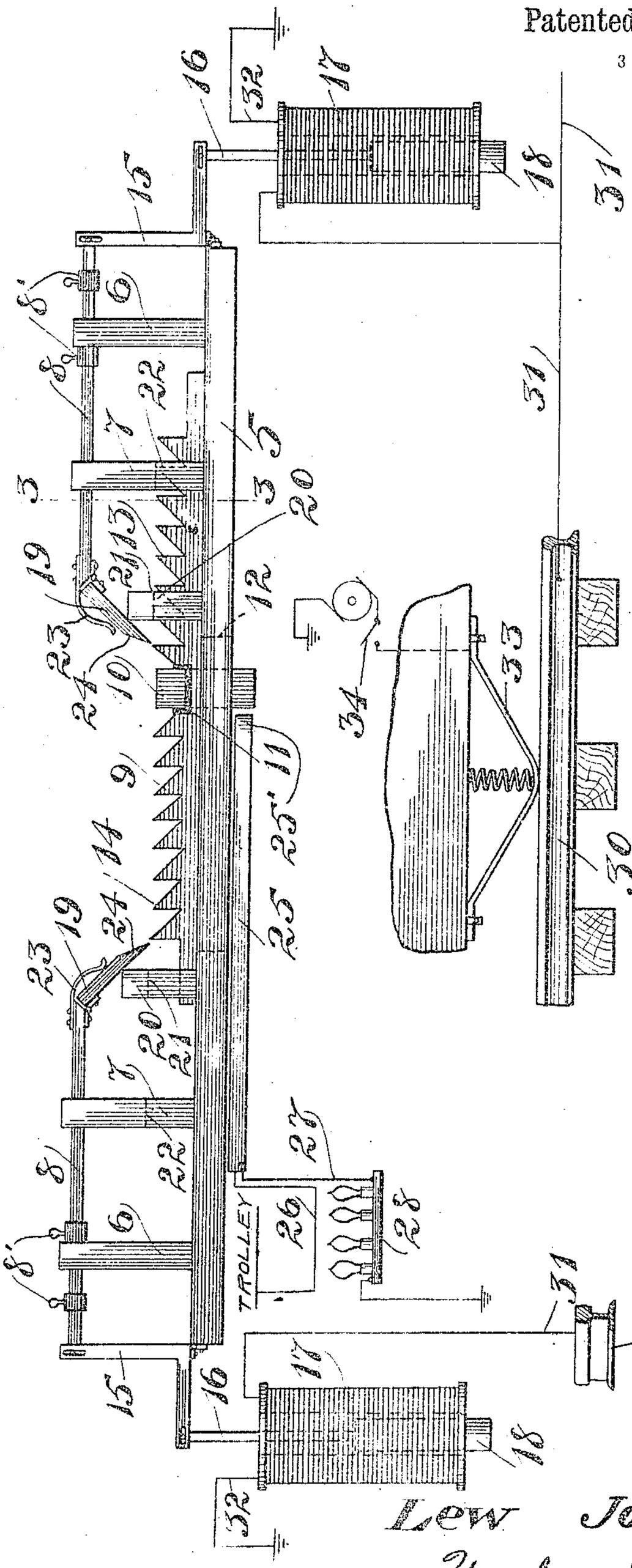

Fig. 1.

Witness

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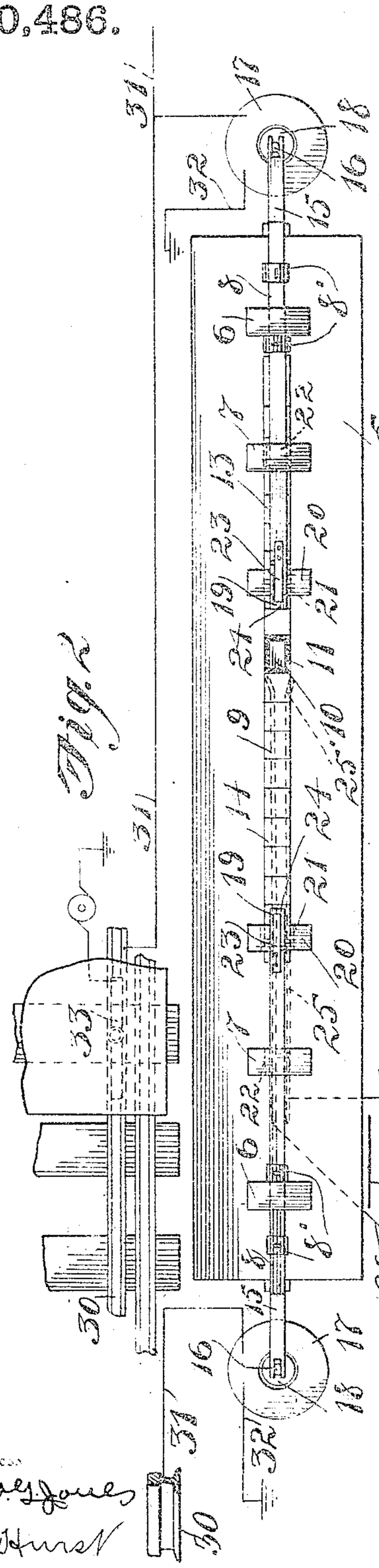

Fig. 2.

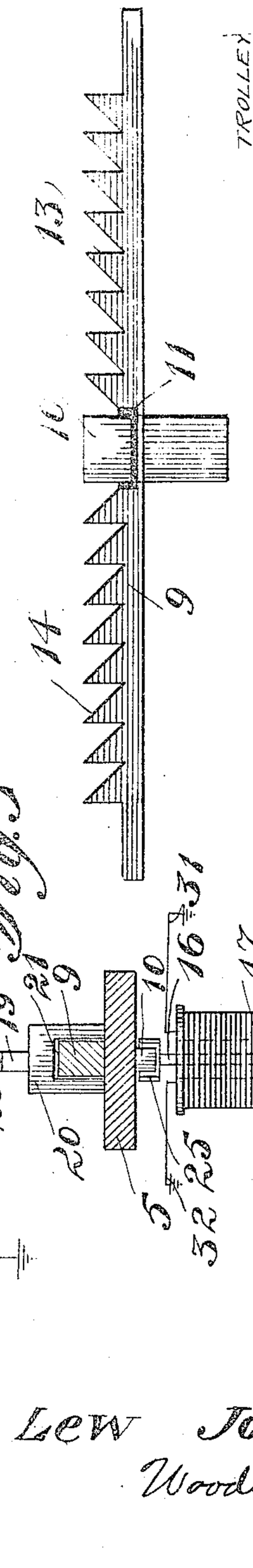

Fig. 3.

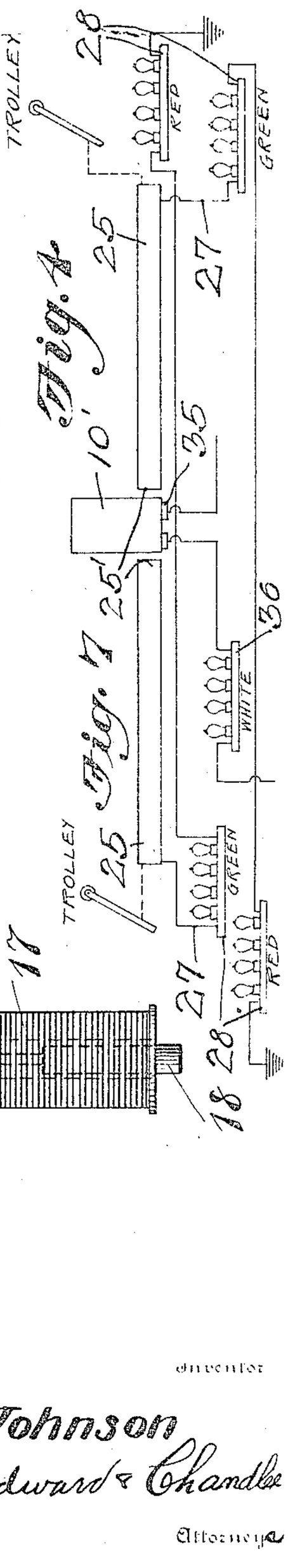

Fig. 4.

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3 SHEETS—SHEET 3.

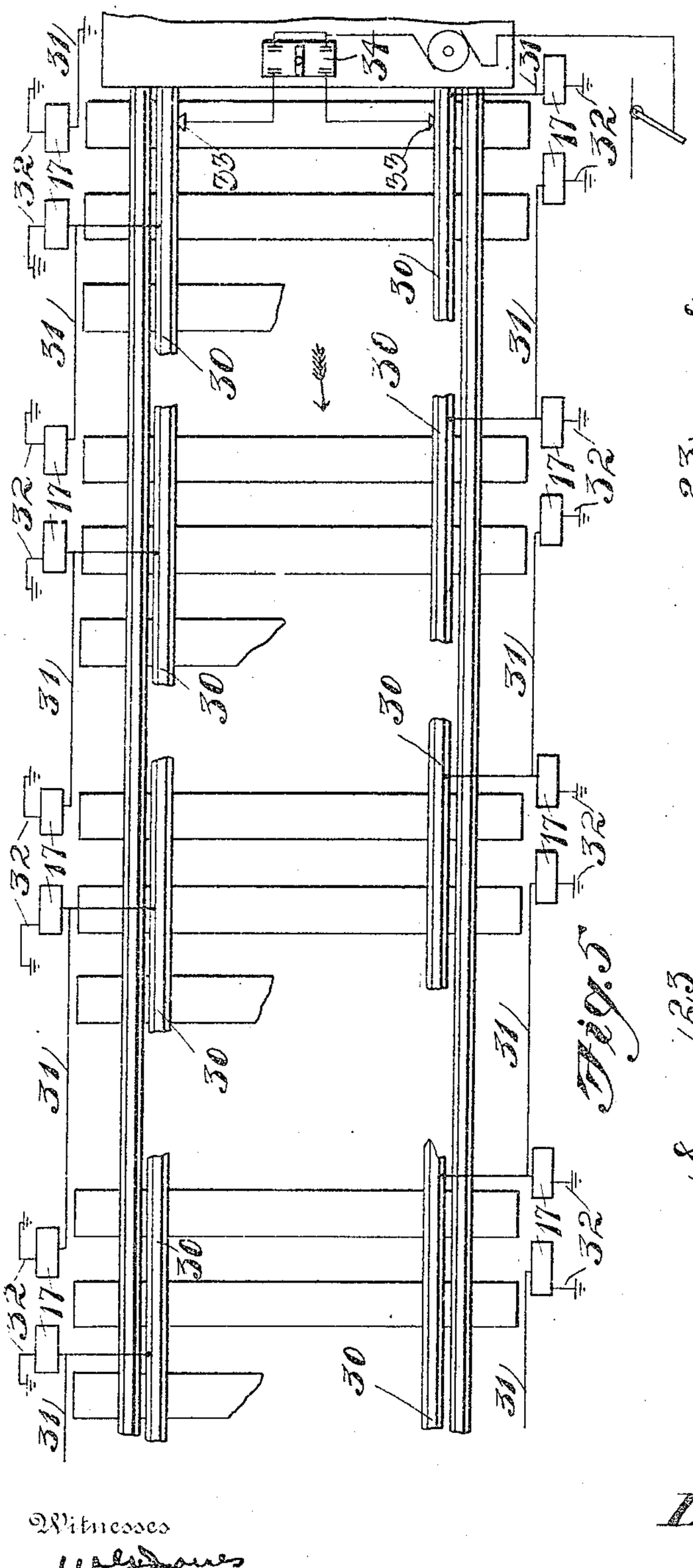

Fig. 5.

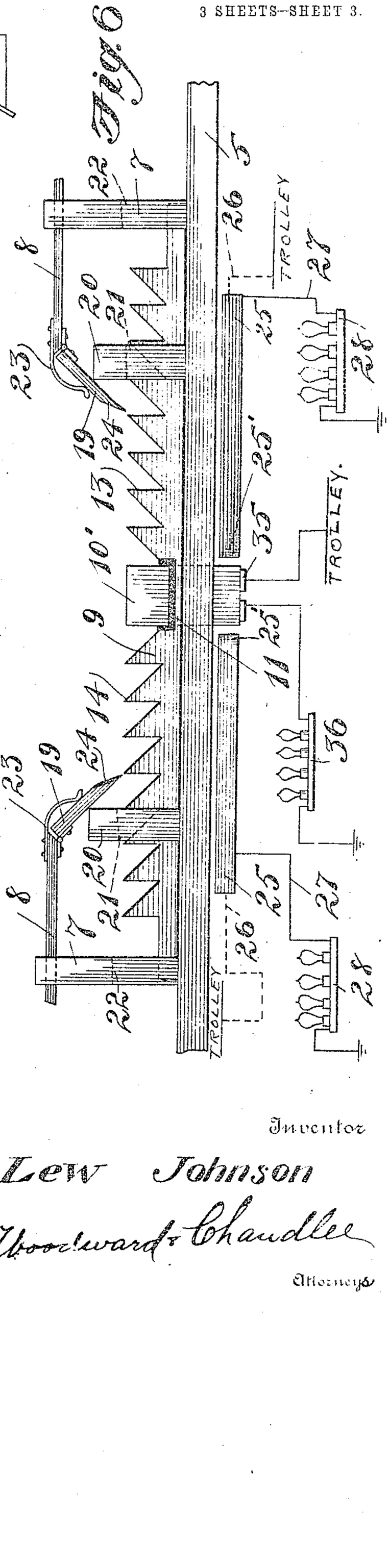

Fig. 6.

Witnesses

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UNITED STATES PATENT OFFICE.

LEW JOHNSON, OF AMES, IOWA.

RAILWAY BLOCK-SIGNAL SYSTEM.

990,486. Specification of Letters Patent. Patented Apr. 25, 1911.

Application filed September 15, 1909. Serial No. 517,862.

To all whom it may concern:

Be it known that I, LEW JOHNSON, a citizen of the United States, residing at Ames, in the county of Story and State of Iowa, have invented certain new and useful Improvements in Railway Block-Signal Systems, of which the following is a specification.

This invention has relation to certain new and useful improvements in railway block signals systems, and has for its primary object to provide means whereby a plurality of cars may occupy the same block at the same time, indicating by means of suitable electric lights to warn an approaching train of the fact that the said block is occupied and the direction of movement of the train therein.

Another object is to provide an automatically operated contact member which is moved by each of the cars entering the block into engagement with the contacts of an electric circuit to illuminate the signal lights, and as the cars leave the block, said contact member is moved in the opposite direction and when the last car has left the block the electric circuit is disconnected and the lights extinguished.

A further object is to provide an extremely simple automatically operated mechanism for the block signal system which is absolutely positive in its operation, and is at all times under the control of the motorman of the car.

With these and other objects in view, the present invention consists in the combination and arrangement of parts as will be hereinafter more fully described and particularly pointed out in the appended claims, it being understood that changes in the specific structure shown and described may be made within the scope of the claims without departing from the spirit of the invention.

In the drawings forming a portion of this specification, and in which like numerals of reference indicate similar parts in the several views, Figure 1 is a side elevation of my improvements, a portion of the car and third rail being shown diagrammatically. Fig. 2 is a top plan view, Fig. 3 is a section on the line 3—3 of Fig. 1, Fig. 4 is a detail view of the sliding block carrying member, Fig. 5 is a top plan view of the track, showing the wiring of the third rails to the switch carried by the car, Fig. 6 is a view similar to Fig. 1, illustrating a slightly modified form of my invention. Fig. 7 is a diagrammatic view of a further modified system employed with my improved apparatus.

Referring to the drawings, 5 indicates a base, which may be of any desired form and constructed of any preferred material. Mounted upon this base are the vertical standards 6 and 7, through which a rod or bar 8 extends and is adapted to have longitudinal movement, suitable openings being formed adjacent to the upper ends of the standards to receive the rod. Disposed upon the base 5 and normally positioned between the standards 7 there is a slidable block carrying member 9. The contact block 10 is arranged at the longitudinal center of the member 9 and is insulated therefrom as shown at 11. This block extends through a longitudinal slot 12 provided in the base 5 and is adapted to be moved therein as will be later described. The member 9 is provided with the teeth 13 and 14 upon either side of the center thereof. It will be noted that these teeth are disposed in opposite directions, or in other words their inclined faces are disposed inwardly from the ends of the member. Stops 8′ are adjustably secured to the bars 8 to limit the longitudinal movement thereof. Bell crank levers 15 are pivoted upon the opposite ends of the base 5, and the ends thereof are bifurcated to receive the outer end of each of the rods or bars 8, and the upper end of a core rod 16, which are pivoted therein. The core rods 16 extend centrally and vertically through the solenoids 17, and have secured to their lower ends the cores 18 which are vertically movable through the solenoids upon the magnetization thereof it being understood that I provide two of such solenoids. The inner ends of the rods 8 have pivoted thereupon the spring pressed bars 19, which are normally in engagement with the upper ends of the posts 20. The member 9 is movable through the openings 21 and 22 provided in the posts 20 and the standards 7. The bar 19 is engaged by a leaf spring 23, one end of which is secured to the bar or rod 8. The free ends of the bars 19 are beveled as shown at 24 for engagement with the teeth 13 and 14 disposed in opposite directions upon either side of the contact block 10, the latter of which is disposed centrally of the member 9 and said bars are adapted to move the member 9 upon the

base when the core rods 16 are elevated by the magnetization of the solenoids.

Disposed beneath the base 5 are the parallel contact plates 25, the inner ends of which are flared as shown at 25′ in which the contact block 10 is received. One of the contact plates 25 is connected by the wire 26 to a suitable feed or trolley wire or other convenient source of electromotive force, the other of the plates being wired as shown at 27 to a plurality of incandescent electric lights 28, a ground wire being also connected thereto.

The solenoids 17 are supplied with the electric current through the medium of a short length of third rail 30 which is disposed in parallel relation to the track and located at one end of each of the blocks. The solenoids are connected to the third rails by means of the circuit wires 31, and the ground wire 32 is likewise connected to the solenoids as shown.

A contact shoe 33 is secured to the car body and is wired to the source of supply carried by the car. This shoe is adapted to engage with the third rail, thus conveying the current through the wire 31 to the solenoids.

A switch 34 is located upon the car within convenient reach of the motorman. This switch is of the usual knife-switch variety, and as shown is adapted to connect the circuit through either of the third rails located adjacent to each of the track rails, whereby the solenoids may be magnetized to operate the signal mechanism when the car is traveling in either direction. The switch 34 is wired to the third rails 30 through the contact of the shoes 33 therewith, as shown in Figs. 1 and 5 of the drawings.

In Figs. 1 and 2 of the drawings, I have indicated my device as adapted for use by a steam railroad and in which instance the necessary current is supplied by a suitable dynamo carried upon the car, whereas in Fig. 5 I have indicated the device for use in connection with an electrically driven car.

In the operation of the device, when a train enters the block, the contact shoe 33 engages with one of the rails 30 and energizes the magnetic coil or solenoid 17, whereupon the core 18 will be drawn upwardly, and the core rod 16 will rock the bell crank lever 15 to reciprocate the bar or rod 8. As the bar 8 is moved forwardly or inwardly toward the center of the base, the spring 23 will force the pivoted bar 19 arranged on the end thereof, into engagement with the first of the eight teeth provided upon one side of the center of the member 9. Thus the member 9 will be moved toward the opposite end of the base, and carry the contact block 10 into engagement with the flared ends of the contact plates 25. The circuit through the plates and trolley is thus closed and the indicating bulbs 28 are illuminated. As the shoe 33 moves off of the rail 30, the solenoids 17 will be deënergized, whereupon the core 18 and rod 16 will assume their normal positions, and the pivoted bar 19 be retracted for engagement with the next of the teeth of the slidable member 9. Each succeeding car that enters the block will repeat this operation of the various parts, and as eight teeth are shown upon the opposite end of the member 9, it will be obvious that eight cars may occupy a single block at the same time, which, however, would only occur should there be trouble on the line, and in such instance the motorman will be duly notified and will therefore proceed very slowly. Each of the cars will therefore move the contact block 10 a distance of one tooth between the plates 25 until it is disposed at the outer ends of the plates, when the last of the cars will have entered the block. As the cars begin to leave the block to enter the next adjacent block, the other of the solenoids 17 is energized to reciprocate the bar 8 and to move the slidable member 9 as previously described. As the teeth 14 upon this end of the member are disposed oppositely to those upon the other end thereof, the member 9 will be moved in the reverse direction, and the contact block 10 moves inwardly between the contact plates 25. At the same time the solenoid of the next succeeding block is also energized to move the member 9 arranged in said block to illuminate the lights of the block and thus indicate that the car has moved from one block to the other.

As shown in Fig. 5 of the drawings I have provided the third rail 30 on either side of the trackway, and also indicated the circuit as arranged for a section of road. In this instance the third rail sections 30 are provided at intervals along the road and are adapted to contact with the shoes 33, to display the lights at either side of the trackway according to the position of the switch 34 carried by the train. It is therefore obvious that this system may be used in connection with a single trackway line, so that a train which may be proceeding in either direction will operate to display the light, which may be of different colors to indicate the direction in which the train is approaching, but said system, however, may be employed with a two trackway system, when either one of said third rail sections may be employed, as desired, so that should one of said sections become inoperative the other section may be employed as alternative thereto, or I may omit one of said sections in connection with a two track system, but as such cases are clearly apparent it is deemed that no further illustration thereof is necessary.

The purpose of a system in which the

lights from a preceding block are extinguished at the same time the lights in an advance block are placed in circuit is clearly apparent. Thus when the train leaves said block in which the lights were previously lighted the same will be extinguished and the motorman of a succeeding train be given indication that said block is clear, but should he approach the block in which the preceding train is positioned, he will be clearly notified of the danger ahead of him and will therefore proceed slowly in order that no collision may occur. This idea will continue throughout the line and in each case where the block is clear the lights will be extinguished and where the lights are lighted the motorman will be notified of the danger due to such lighting and the presence of another train in the same block, and he will thus be advised as to the condition of the block at all times.

In Fig. 6 there is illustrated a slightly modified form of my invention, wherein the contact block 10′ when in its normal position is engaged with a spring contact plate 35 and is adapted to illuminate the white incandescent electric lights 36 to indicate that there is no car in the block. When the car moves the member 9 through the magnetization of the solenoids into engagement with the spring plate 25, red signal lights will be illuminated to show that the block is occupied, and if desired may use two different colored lights, preferably other than green, so as to indicate the direction in which the train is moving. This form of the device is particularly adapted for a single track railway, and in all other respects is operated in a similar manner to that previously described.

From the foregoing it will be observed that I have provided a block signal system and operating mechanism therefor which is of extreme simplicity and may be automatically operated to indicate the occupancy of the different blocks.

It will be understood that any desired number of the teeth 13, 14 may be provided on the member 9 so that as many cars may occupy a block at one time as the particular railway system to which my device is applied may require.

It may be desirable to amplify the connections for the mechanism illustrated in Fig. 6 as shown in Fig. 7, so that the device will be arranged to operate and thereby illuminate red lights at the far end of the block from the car entering thereon, and green lights at the near end in the same circuit so that a car following would understand that it could enter the block following another train, while cars moving in the opposite direction would be positively warned against entering the block. As soon as all cars are out of the block, the device will be returned to neutral position with white lights lighted, indicating a clear passage at both ends of the block so that cars may enter from either direction.

What is claimed is:

1. In a railway block signal system, a base, a movable member mounted on said base, bell crank levers pivoted on the ends of the base, two reciprocating bars, each bar being pivotally connected to one end of one of said levers, a solenoid arranged at each end of the base, the other ends of the bell crank levers being pivotally connected to the solenoid cores, and adapted to be actuated thereby, hinged bars secured to the reciprocating bars, said hinged bars being engaged with the movable member to move the same in either direction, a contact block carried by said member, contact plates engaged by said contact block, a normally open circuit including said contact plates, a signaling device in said circuit operated by contact of the block and plates, a circuit for each solenoid and means for closing said circuits to energize the solenoids.

2. In a railway block signal system, a supporting base, a longitudinally movable member disposed upon said base, bell crank levers pivoted on the ends of the base, standards carried by the base, reciprocating bars mounted in said standards and adapted to operate the movable member to move the same in either direction, contact plates, a contact block carried by the movable member adapted to engage with the contact plates, a normally open circuit including said contact plates and closed by such engagement, a suitable signaling device operated thereby, a solenoid arranged at each end of the base, the outer end of each of the bell crank levers being pivotally connected to the upper end of the corresponding solenoid core, a circuit for each of said solenoids and means for closing the circuits to magnetize the solenoids and move said contact block into and out of engagement with the contact plates to close and open the first named circuit.

3. In a railway block signal system, the combination with a supporting base, a movable member mounted upon said base, said movable member being provided with teeth disposed in opposite directions, reciprocating bars mounted above said movable member, stops arranged upon said bars to limit their movement, a hinged member carried by the inner end of each of the bars, a spring engaging with each of said bars to depress the hinged member into engagement with the teeth on the movable member, a bell crank lever pivotally mounted upon each end of the base, a solenoid arranged adjacent each of said ends and adapted to actuate its corresponding lever, a contact block carried by the movable member and

insulated therefrom, suitable contact plates engaged by said block, a normally open circuit including said contact plates, a signaling device operated by such engagement and means adapted to energize the solenoids to actuate the operating mechanism.

4. A railway block signal system, comprising a supporting base having a longitudinal slot therein, a longitudinally movable member mounted thereon, standards mounted on the base, reciprocating rods mounted in said standards, a bell crank lever pivotally secured to each end of the base, a contact block carried by the movable member, said block extending through the slot formed in the base, teeth formed on the movable member disposed in opposite directions upon either side of the contact block, spring actuated plates pivoted to the inner ends of the reciprocating bars, contact plates arranged adjacent to the block adapted to receive the same, a circuit including said contacts and a signaling device, a solenoid arranged at each end of the base each connected to the outer end of the corresponding bell crank, a circuit for each solenoid, means for closing each of the circuits last mentioned, to energize the solenoids and raise the cores thereof, whereby the contact block will be moved into and out of engagement with the plates upon reciprocation of the bars, and thereby set the signal into operation.

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

LEW JOHNSON.

Witnesses:
E. A. MUSGROVE,
H. GOLDING.