J. T. WEST.

BLOCK SIGNAL SYSTEM FOR RAILWAYS.

APPLICATION FILED MAR. 25, 1908.

900,456.

Patented Oct. 6, 1908.

3 SHEETS—SHEET 1.

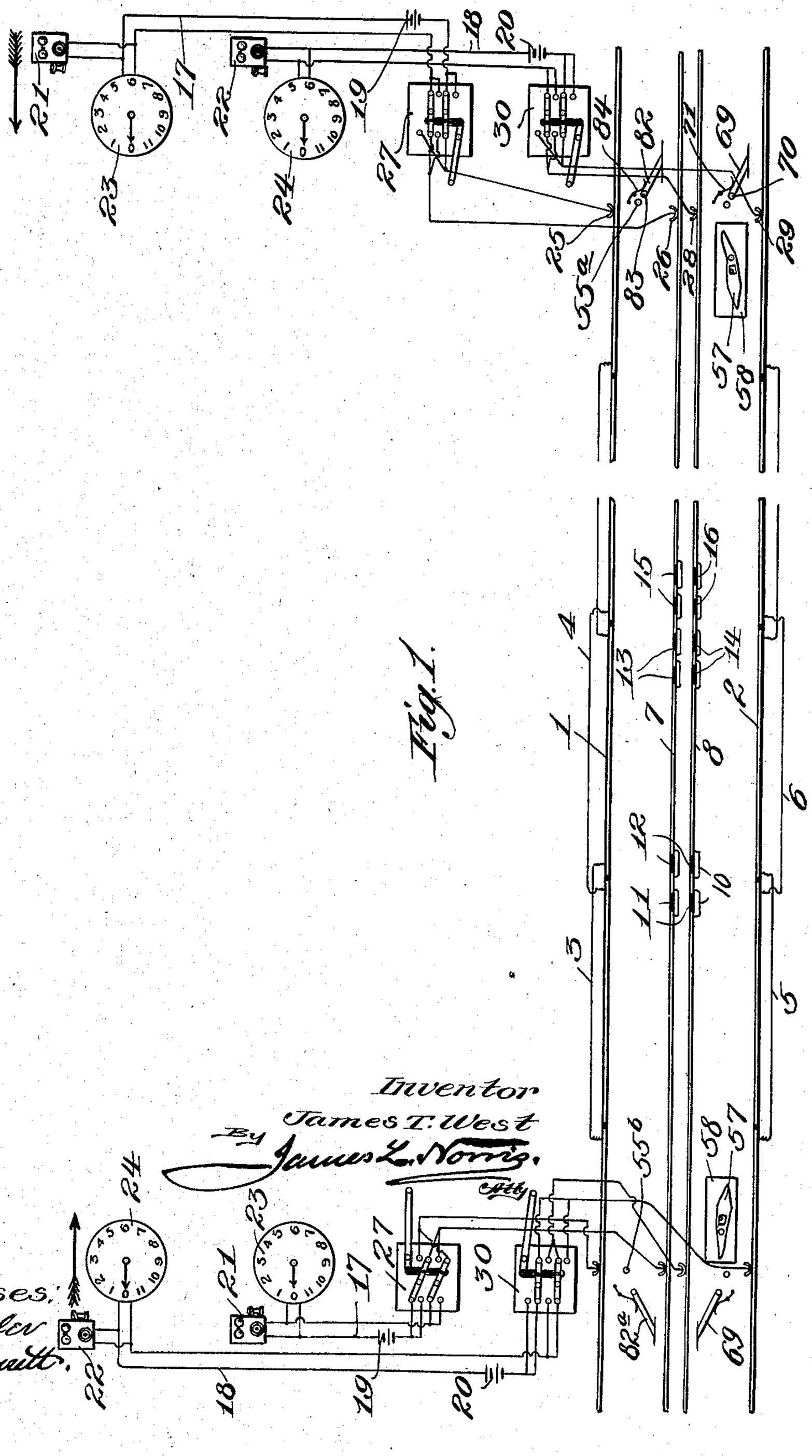

Fig. 1.

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3 SHEETS—SHEET 2.

Fig. 2.

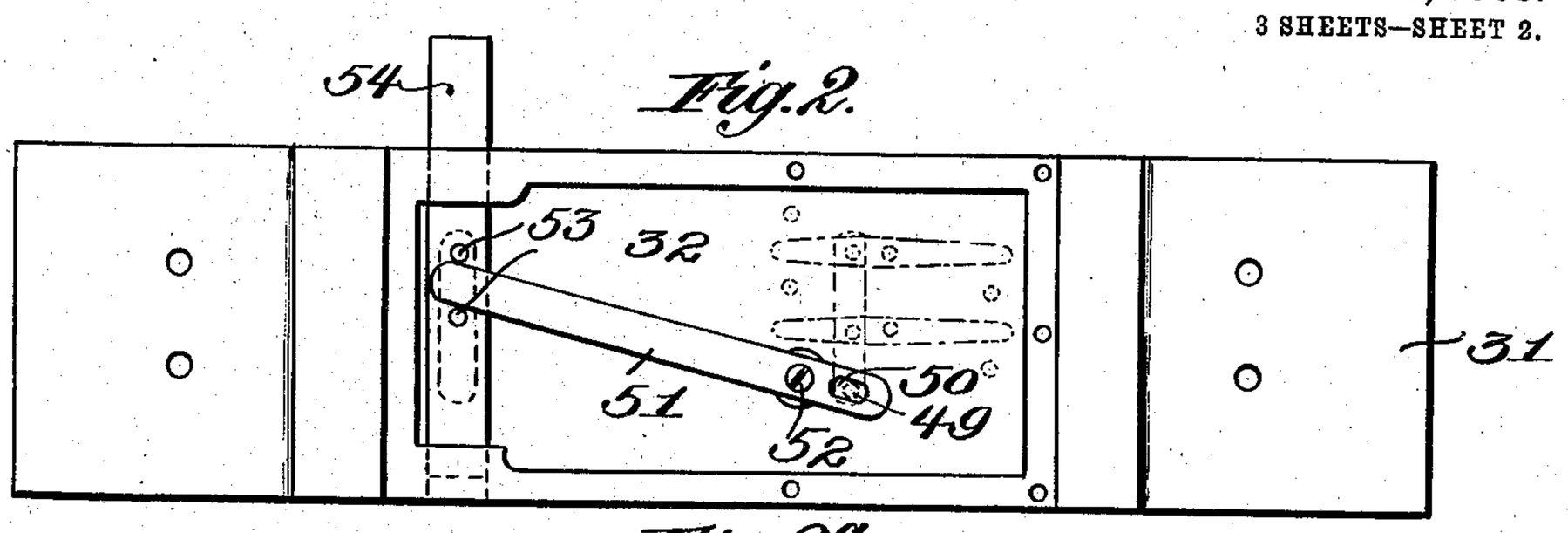


Fig. 2a.

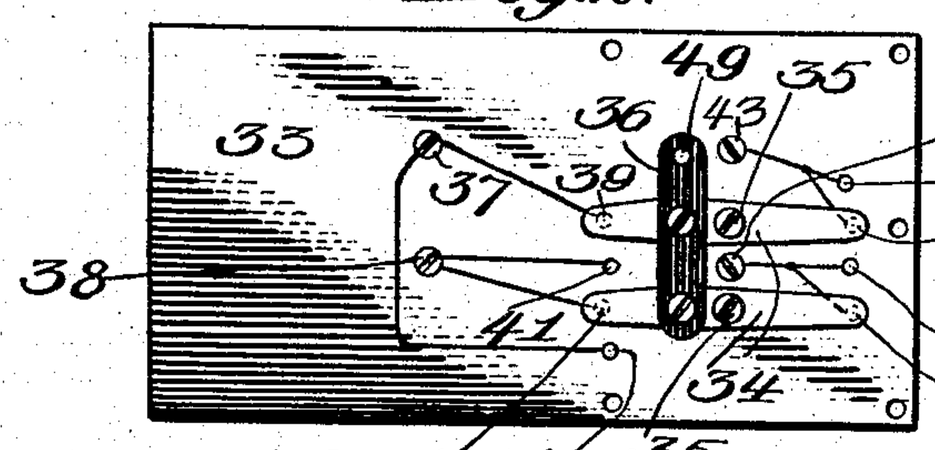


Fig. 3.

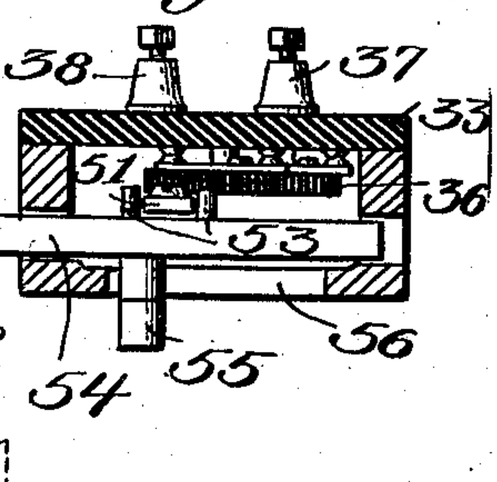


Fig. 4.

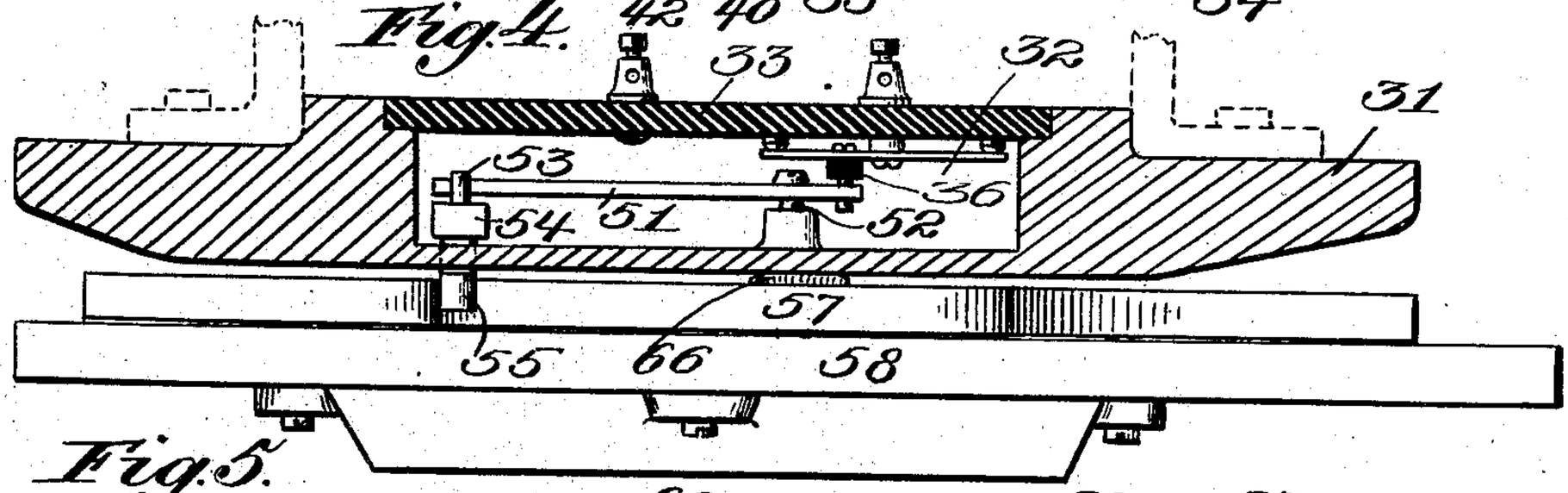


Fig. 5.

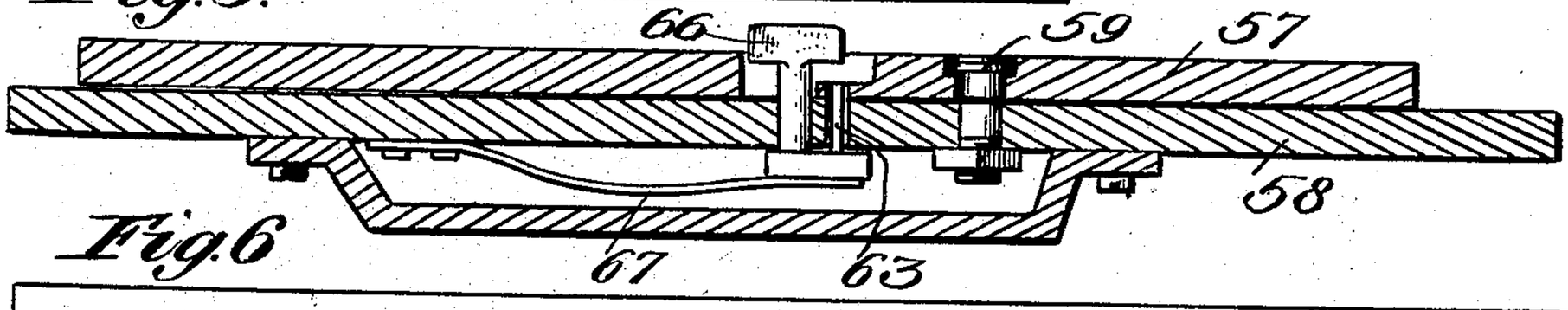
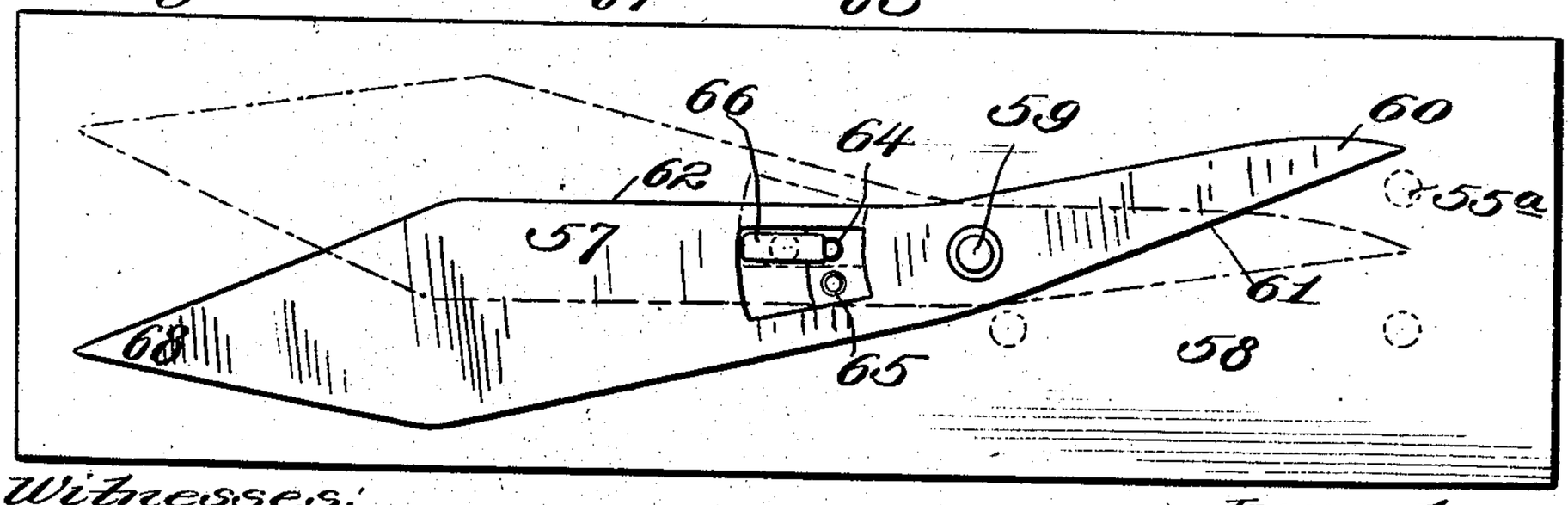


Fig. 6



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3 SHEETS—SHEET 3.

Fig. 7.

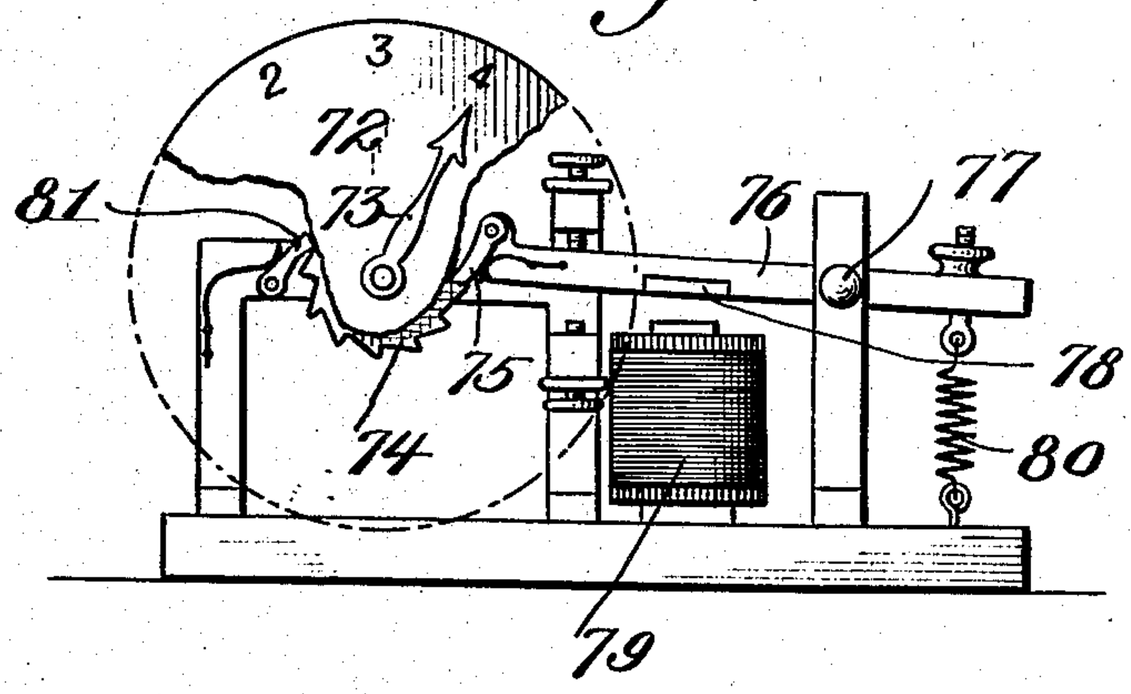


Fig. 8.

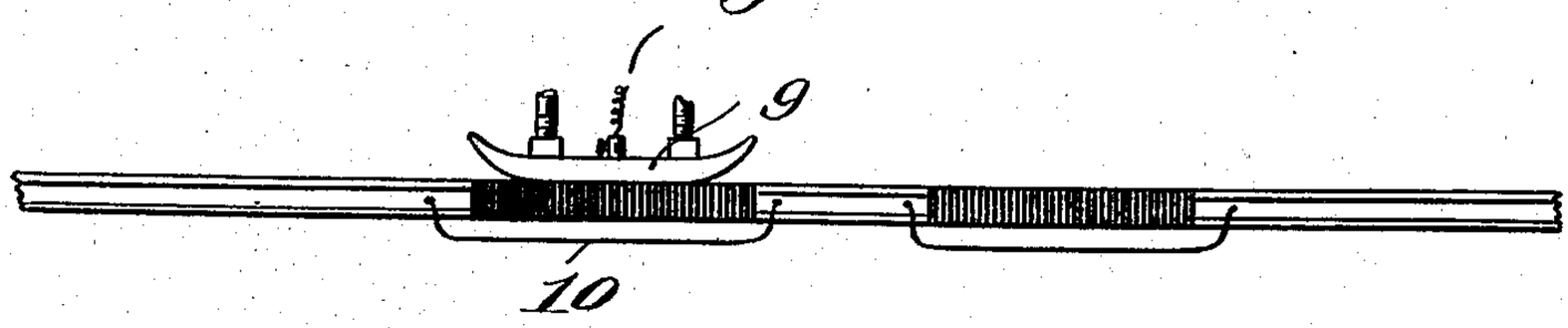
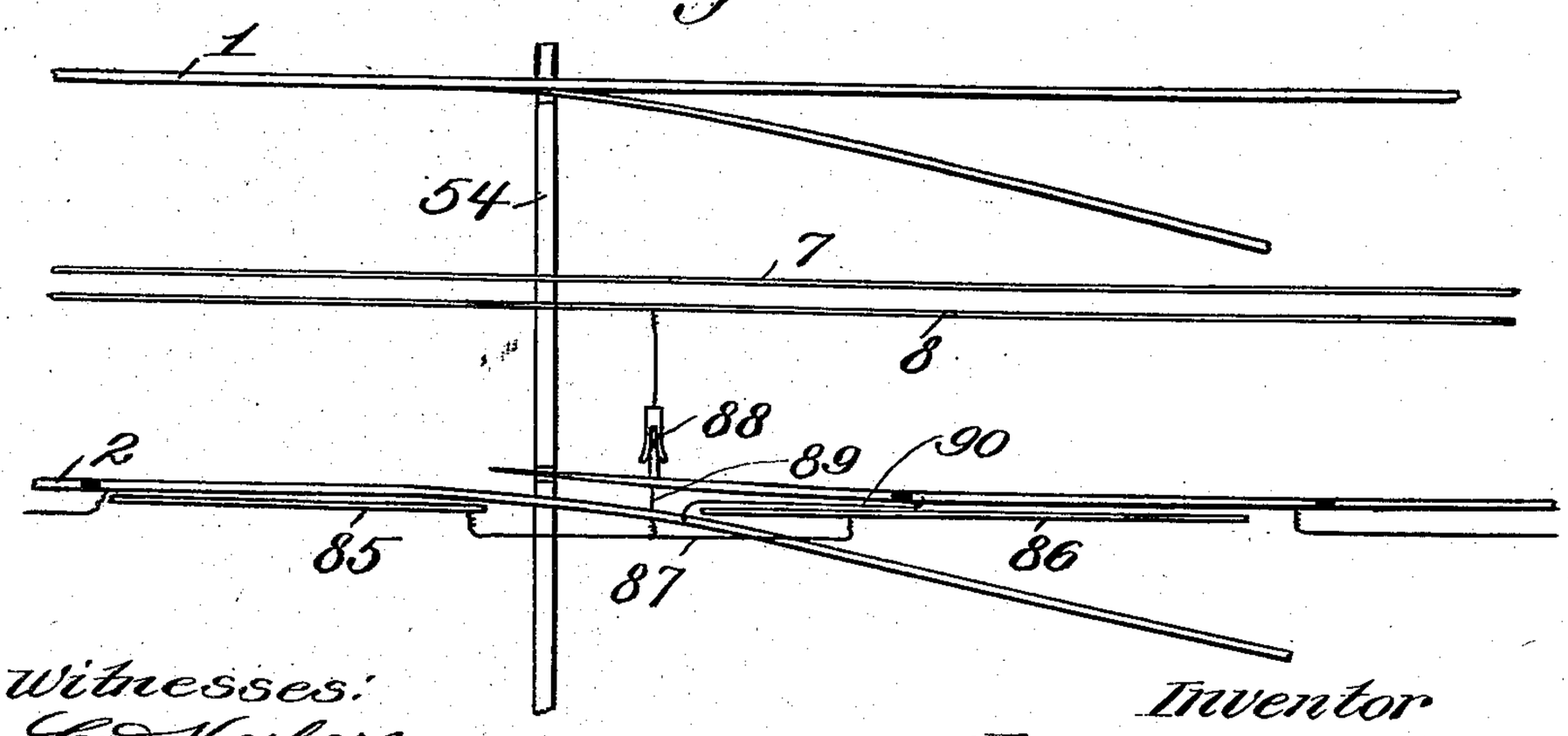


Fig. 9.



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UNITED STATES PATENT OFFICE.

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BLOCK-SIGNAL SYSTEM FOR RAILWAYS.

No. 900,456. Specification of Letters Patent. Patented Oct. 6, 1908.

Application filed March 25, 1908. Serial No. 423,178.

To all whom it may concern:

Be it known that I, JAMES T. WEST, a citizen of the United States, residing at Rockingham, in the county of Richmond and State of North Carolina, have invented new and useful Improvements in Block-Signal Systems for Railways, of which the following is a specification.

My present invention relates to improvements in signaling apparatus and more especially to the class adapted for use on railways for preventing collisions between trains or other moving vehicles, and has for its object primarily to provide an improved system of this character, whereby head-on collisions between trains moving in opposite directions or rear-end collisions between trains moving in the same direction are prevented.

Another object of the invention is to provide a system of this character wherein the track is divided into block sections of appropriate length, and the locomotives or other vehicles traveling thereon are provided with signal devices which are connected in circuit with the block sections of the track, the signaling devices on one locomotive or vehicle being set according to the movements of another locomotive or vehicle which may be moving either in the same or an opposite direction, the signaling device on each locomotive indicating to the engineer the relative proximity of the trains so that when one train enters the danger zone of another train, the signaling device on such train or trains will indicate such fact and the necessary precautions may be taken to avoid a collision.

A further object of the invention is to provide automatically operating devices which are arranged in the road bed for properly setting the circuits on the respective trains in order to insure the proper operation of the respective signaling devices thereon.

To these and other ends the invention consists in certain improvements and combinations and arrangements of parts, all as will be hereinafter more fully described, the novel features being pointed out particularly in the claims at the end of the specification.

In the accompanying drawings:—Figure 1 is a diagrammatic view of a section of a railroad divided into block sections and representing the signaling devices carried upon two of the trains. Figs. 2 and 2ª are detail views of a circuit controlling or pole changing device. Fig. 3 represents a transverse section of such pole changing device. Fig. 4 represents a longitudinal section of the circuit controller or pole changing device showing the actuating device therefor in coöperative relation therewith. Fig. 5 represents a longitudinal section, and Fig. 6 is a plan view of the actuating device for the pole changer. Fig. 7 is a detail view of the actuating mechanism for one of the visual indicators. Fig. 8 represents a section of one of the conductor rails showing the contact shoe in position on one of the insulated sections thereof, and Fig. 9 is a diagrammatic view showing a safety device applied to a switch or side track.

Similar parts are designated by the same reference characters in the several views.

Signaling systems embodying my invention are capable of being used in connection with steam or electric railways of various kinds, and it may be used either on single track roads where the trains move in both directions on the same track or on a double track road where the trains move in one direction only on each track. In the present instance the system is shown in connection with a single track road wherein the trains travel in both directions on the same track.

In equipping a railroad with a signaling system embodying my present invention, the usual rails over which the wheels of the vehicles pass are divided into block sections 1 and 2, these sections being of an appropriate length and electrically insulated from one another. The block sections 1 are connected by wires 3 and 4 which extend along the track and connect the alternate insulated block sections, and the block sections 2 of the opposite rail are similarly connected by the wires 5 and 6. In each case the sections connected by the wires 3 and 5 are insulated from those sections which are connected by the wires 4 and 6 respectively and vice-versa. Extending parallel to the road bed are arranged a pair of conducting rails 7 and 8, which provide a signaling circuit for the signals carried by the locomotive. For convenience it is preferable to arrange these conducting rails between the traffic rails, and each vehicle is equipped with a pair of contact shoes which travel over the respective contact rails. At the end of each block section and at the beginning of each adjacent block section, both contact rails are provided with a prearranged number of insulated sections over which the shoes on each vehicle pass, and while such shoes are passing over these

insulated sections the signaling circuits on the respective vehicles are broken, such circuits being again closed after the shoes leave such insulated sections and reënter upon the conducting portions of such rails. The conducting rails are electrically connected throughout their length, the bonding wires 10 serving to complete the circuit around the insulated sections thereof. In the diagram shown in Fig. 1, the conducting rails at the end of the second block from the left are provided with a pair of insulated sections 11, and at the beginning of the third block from the left, a similar pair of insulated sections 12 is shown. At the end of the third block, two pairs of insulated sections 13 and 14 are provided in the conducting rails, and at the beginning of the fourth block from the left similar pairs of insulated sections 15 and 16 are shown. In order that the engineer on one train may ascertain the exact position of a second train, it is preferable to vary the number of insulated sections so that a different number of impulses will be transmitted to the signaling device each time the train passes out of one block and enters another block, and in the present instance I contemplate increasing the number of such insulated sections progressively from one end of the road section toward the other.

In those cases where a train is to be protected both from trains approaching in an opposite direction as well as those traveling in the same direction and approaching the front or rear thereof, such train, preferably the locomotive, is equipped with a pair of signaling circuits, each of such circuits having suitable signaling devices arranged in the cab of the locomotive for indicating the approach of a train from the front or rear respectively. In the present instance each train is equipped with two signaling circuits 17 and 18 which are practically duplicates and provided with batteries or other appropriate source of current supply 19 and 20. Telephones 21 and 22 are connected in each of these signaling circuits, whereby the engineer on the respective train may be put in audible communication with another train approaching the front or rear, and in addition to these telephones, it is preferable to equip each signaling circuit with the signaling devices 23 and 24 which serve to indicate visually the exact position occupied by the second train. The terminals of the circuit 17 are connected to a pair of contact shoes 25 and 26 which travel respectively on one of the traffic rail sections and one of the conducting rails, and this circuit is provided with a pole changer 27 which serves to reverse the polarity of the contact shoe with respect to the battery and signaling devices of such circuit. The other circuit 18 carried by the same vehicle has its terminals connected to a pair of contact shoes 28 and 29 which travel respectively on the remaining conducting rail and traffic rail sections as shown in Fig. 1. The circuit 18 is also provided with a pole changer 30 by means of which the polarity of the respective shoes 28 and 29 may be reversed. The pole changers employed in these two circuits may be of any appropriate construction, and they are preferably arranged equidistantly upon the under side of the frame-work of the locomotive or other vehicle. These pole changers in the present instance are duplicates, each being mounted upon a shoe 31, having its opposite ends beveled as shown and provided with a chamber 32 within which the operating mechanism of the switch is inclosed. The contacts and switch mechanism are secured to a plate 33 preferably of insulating material which fits into a recess formed at the top of the shoe 31 and is secured or otherwise fastened in place so as to close the chamber 32 therein. The switch shown in the present instance comprises a pair of pivoted blades 34 mounted on the insulating plate at 35 and are connected for simultaneous movement by means of a link 36. Those terminals of the respective signaling circuits which are connected to the contact shoes lead to the binding posts 37 and 38, the post 37 being connected to the contact points 39 and 40 of the switch, while the post 38 is connected to the two adjacent contact points 41 and 42. That side of the respective signaling circuit which contains the battery and the signaling devices has its terminals connected to binding posts 43 and 44, the post 43 leading to the contact points 45 and 46, while the post 44 is connected to the contact points 47 and 48. Obviously a shifting movement of the switch blades by a reciprocation of the link 36 will alternately reverse the polarity of the contact shoes which are electrically connected to the posts 37 and 38. The switch mechanism just described is mounted on the under side of the insulated plate 33, and the link 36 is provided with an operating pin 49 which is adapted to coöperate with a slot 50 formed in an operating lever 51. The latter is pivoted at 52 and coöperates at its free end with a pair of pins 53 which project upwardly from a transversely movable member 54 which is guided to operate within the shoe 31 and has an operating projection 55 which extends downwardly through a slot 56 in the bottom of said shoe so as to be engaged and operated by suitable track devices.

According to the diagram shown in Fig. 1, the circuit 17 serves to indicate the movement of a second train approaching from the front of the train carrying the signaling devices, while the circuit 18 serves to indicate the position of another train on the same track and moving in the same direction. In case two or more trains leave the same station moving in the same direction, it is necessary to alternately reverse the polarity of the

contact shoes 28 and 29 of each train so that the current will flow in the proper direction through the batteries and signaling devices on both trains. In order to accomplish this result automatically, a switch throwing device is employed, that shown in the present instance comprising a cam-shaped lever 57 which is pivoted upon a plate or other stationary support 58 at a point at one side of the space between the rails. This cam-shaped lever is pivoted to the plate at 59 and has a pointed end 60 with inclined surfaces leading along the opposite sides thereof, the inclined surface 61 serving to deflect the switch operating projection 55 in one direction when the cam-shaped lever occupies the position shown in full lines in Fig. 6, and the inclined surface 62 formed on said lever at the opposite side of the pivot 59 serves to return the cam-shaped lever to the position shown by the full lines in Fig. 6 should the switch operating projection 55 encounter such lever while it occupies the position shown by the dotted lines in this figure. This cam-shaped lever is locked in either of these two positions by means of a pin 63 which extends through an aperture in the plate 58 and coöperates with either of the two apertures 64 or 65 formed in the cam-shaped lever, and this pin is depressed so as to disengage from either of these two apertures by means of a treadle or plunger 66 which rides upon the under side of the shoe 31, a spring 67 coöperating with the under side of this treadle and serving to normally retain the locking pin in locked position. The treadle 66 is located at such a distance from the end 60 of the cam-shaped lever in proportion to the length of the shoe 31 that the treadle 66 will be depressed to unlock the cam-shaped lever a moment before the switch operating projection 55 reaches the inclined surface 62 on such lever so that while the switch operating pin is traversing this inclined surface, the lever 57 may be turned into the position shown by the full lines in Fig. 6. The end 68 of the cam-shaped lever is preferably beveled or pointed in order that switch operating pins carried by locomotives which are backing into position will pass this lever without damage. As each locomotive approaches the end 60 of the switch throwing lever, the projection 55 thereon is deflected into the position shown by the dotted circle at 55[a] in Fig. 6, this result being accomplished by means of a deflector 69 mounted in the track immediately in advance of the end 60 of the switch throwing lever, this deflector being preferably pivoted at 70 and provided with a spring 71 which normally returns it to proper position. By pivoting this deflector, the latter may be temporarily displaced by the switch operating projection on a locomotive which is backing into position. The visual indicators carried by each locomotive may be of any suitable construction, the indicator shown in Fig. 7 comprising a dial 72 suitably graduated with a scale of numerals or other indicia with which coöperates a pointer 73, the latter being mounted on a shaft carrying a ratchet wheel 74. This ratchet wheel is provided with teeth corresponding in number to the graduations on the dial, and a pawl 75 coöperates successively with the said teeth to progressively advance the hand or pointer. This pawl is mounted on a lever 76 which is pivoted at 77 and provided with an armature 78 which coöperates with a magnet 79, the pawl being retracted after each attraction by the magnet by means of a spring 80 and retrograde movement of the ratchet wheel is prevented by a second pawl 81. The magnet 79 of each indicator is connected in its respective signaling circuit 17 or 18 so that each impulse through said circuit will cause its respective pointer to be advanced around the dial.

In equipping railroads wherein the trains move in both directions on the same track, a switch throwing device for controlling the electric circuits on each train is located at each station or starting point, the purpose of this device being to insure the proper polarity of the batteries carried by two trains approaching one another while moving in opposite directions. In Fig. 1 a guard or deflector 82 is arranged between the traffic rails and at a point opposite to the deflector or guard 69, each of these guards or deflectors 82 being pivoted at 83 and provided with a spring 84 which normally tends to move the free ends thereof toward the center of the track. Trains moving from the right hand end of the track toward the left in Fig. 1 will be encountered by an inclined guard, the switch actuating projection on the pole changer 27 being thrown into the position shown by the circle 55[a], the pole changer 27 being thereby set into the position shown in this figure. The guard or deflector 82[a] at the opposite end of the track or at the next station is inclined in reverse relation to the guard 82, and a train approaching the guard 82[a] from the left will encounter this guard and the switch actuating projection for the pole changer 27 on this train will be moved into the position shown at 55[b], the pole changer 27 on that train being set in the position shown in this figure.

In order to prevent accidents or wrecks at open switches, a safety arrangement such as shown in Fig. 9 is employed. In this instance adjacent rail sections at opposite sides of the switch point are connected by a wire 90, and a pair of conductor rails 85 and 86 extend a suitable distance beside the rails of this section, these conducting rails being electrically connected by the wire 87. The switch point is electrically connected to the wire 89 and is provided with a circuit closing

device 88, one terminal of which is connected to and movable with the switch point and the other terminal is connected to one of the conducting rails 8. When the switch point is moved into an open position, the terminals of the circuit closing device will coöperate to short-circuit the conducting rail 8 and the adjacent rails 85 and 86, one of the signaling circuits on an approaching train being thereby closed in the same manner as would be the case should a train be standing at this point on the track.

Assuming that one train stands at the right hand end of the track which represents a station in Fig. 1 and that a train starts from the station at the left hand end of this figure and moves toward the right; in this instance the guard 82[a] will coöperate with the switch actuating projection on the pole changer 27 of this train and set the pole changer in the position shown at the left hand end of Fig. 1. The switch operating projection on a train standing at the right hand end of this figure will be acted on by the guard 82 to set the pole changer 27 on this train in the position shown at the right hand end of this figure. A circuit will thus be established between the signaling circuits 17 on both trains, the current starting from the battery of the circuits 17 shown at the left hand side of this figure, thence passing through the telephone 21, through the magnet 79 of the signaling device 24 through one blade of the pole changer switch to the contact shoe 25, thence through the traffic rail sections 1 to the corresponding shoe 25 on the train standing at the left hand end of the track, the current then entering at one terminal of the circuit 17 on this train passing through one blade of the pole changer switch, thence through the battery 19, telephone 21, signaling device 23, through the other blade of the pole changer, thence to the contact shoe 26. The current is taken up from this shoe by the conductor rail 7 and traversing the latter toward the left this current is taken up by the contact shoe 26 on the train standing at the left, and from this shoe the current passes through the circuit to one of the blades of the pole changer 27 and from the latter to the return pole of the battery 19, the circuit being thus complete through the signaling circuits 17 on both trains. As the train at the left hand end of the track shown in this figure moves towards the right, the shoe 26 traversing the conducting rail 27 will pass over the insulated sections arranged at the beginning and end of each block section of the track, and as this shoe passes over the insulated sections the current through the signaling circuits 17 will be momentarily interrupted and reëstablished a number of times, determined according to the number of insulated sections which are inserted in the conductor rail. These insulated sections in the conductor rail cause a predetermined number of impulses over the signaling circuits which cause the hands or pointers on the indicators 23 to move progressively about their respective dials, and the engineer on the train standing at the left hand end of the track in Fig. 1 can ascertain the location of the approaching train by reference to the scale upon his respective dial 23. Of course in case the train represented at the left hand end of the track in Fig. 1 is stationary and the train at the right hand end of this figure is moving toward the left, a corresponding series of signals will be transmitted by the moving train and will be indicated on the signaling device 23 carried by the train at the left hand side of the figure, and either before the starting of one or both trains or after the starting thereof, the engineers on the two trains may communicate with one another by means of the telephones 21 which are connected in the respective signaling circuits 17, and if so desired the bells of these telephones may be utilized to give an audible signal in addition to the visual signal which is given by the indicators 23.

In those cases where one train follows another, both moving in the same direction on the same track, the indicators 24 on the respective trains are utilized to indicate the relative positions of the trains. Assuming a train leaves from the station shown at the right hand end of Fig. 1 and moves toward the left and that the switch throwing lever 57 occupies the position shown at the right hand end of Fig. 1; as the train approaches this switch throwing lever, the guard or deflector 69 which is arranged in advance of this switch throwing lever will engage the projection 55 on the pole changer at this side of the locomotive moving inwardly or towards the center of the track. This projection will then be in line with the inclined surface 61 on the switch throwing lever, and this projection will ride upon this inclined surface and will thereby be moved outwardly or toward the adjacent rail, the pin 63 retaining the lever 57 in locked position while this projection travels as far as the center of this lever. When the projection reaches this position, however, the treadle 66 will be depressed by the shoe 31 on the locomotive, thereby causing the lever 57 to be unlocked and the projection 55 on the pole changer will then travel in a direction parallel to the track, thus causing the lever 57 to swing into the position shown by the dotted lines in Fig. 6. The moment the shoe 31 leaves the treadle 66, the pin 63 immediately relocks the lever 57. The pole changer 30 connected in the circuit 18 on this forward train will then be set in the position shown at the right hand side of Fig. 1. The projection 55 of the next following train will encounter the guard 69 and will also be deflected inwardly or toward the center of the track. The lever

57, however, at this time will occupy the position shown by the dotted lines in Fig. 6, the end 60 of the lever being then arranged at the outer side of this projection so that the latter can pass as far as the center of the lever without touching the lever. However, upon reaching a point in proximity to the center of the lever 57, the shoe 31 of this side of the locomotive will depress the treadle 66 and thereby unlock the lever. A continued movement of the projection 55 at this side of the locomotive will cause it to engage the surface 62 which at this time will occupy an inclined position, and as the pin travels along this surface it will cause the lever 57 to be re-set in the position shown by the full lines in Figs. 1 and 6. In this manner the pole changing switch in the signaling circuit 18 of the following train has its polarity reversed, thereby establishing a flow of current through the circuits 18 on both trains. As the forward train traverses the track, the shoe 28 thereon will encounter the insulated sections in the conducting rail 8 at the beginning and end of each block section, and these insulated sections will cause impulses to be transmitted through the circuits 18 on both trains, and as the number of insulated sections varies for each block section, the engineer on the following train can ascertain which block the preceding train occupies by reference to the dial 24, the magnet of which is connected in the signaling circuit 18. Of course in case a train is traveling along the track and no impulses are received over either signaling circuit, it indicates that the track is clear. However, should a switch be open, one of the signaling circuits on the train will be short-circuited and will thus warn the engineer of the danger. Should the trains start simultaneously from opposite ends of the track section, signals will be given on the indicator from both trains, and in this case, the engineers should communicate through the telephone connections and give or receive proper orders to avoid a collision.

A block signaling system constructed in accordance with my invention is composed of a few simple parts all of which, excepting the track circuit are carried by the moving train or trains, and by reference to the signal devices or indicators on such train, the engineer or driver may ascertain with certainty the precise location of a second train which may be within the danger zone thereof. The system is also applicable to railroads wherein the trains move in both directions on a single track, or where such trains follow one another moving in the same direction on the same track, each train being equipped with its own signaling circuits and current supply so that it is unnecessary to equip the roadway with stationary signals of any kind, although the system embodying my invention may be used in conjunction with any existing signal system without interference therewith. The novel switch throwing devices arranged in the track serve to automatically operate the pole changing devices in the signaling circuits on each train as it passes over such devices, so that the signaling circuits on one train are always properly connected in circuit with those on another train which happens to occupy the same track, and as the element of human agency is eliminated in so far as the transmission of the signals is concerned, certainty in the operation of the system is insured.

I claim as my invention:—

1. A signal system for railways comprising current carrying rails extending along the track, a signaling circuit adapted to be carried by a train or vehicle and having a suitable signaling device therein and responsive to current impulses through such circuit, and means located at predetermined distances along the track for opening and closing said signaling circuit in prearranged numbers at different points along the track to actuate said signaling device to give prearranged signals to the operator of such train which will indicate the position of the train on said track.

2. A signaling system for railways comprising current carrying rails extending along the track, a signaling circuit adapted to be carried by a train and having a suitable signaling device connected therein and responsive to current impulses through such circuit, and means arranged at suitable intervals along the track to open and close the signaling circuit in progressively varying numbers for transmitting groups of impulses differing in number as the train passes over certain portions of the track, the signaling devices serving to receive such impulses and to indicate a prearranged signal.

3. A signaling system for railways comprising current carrying rails, one of said rails being provided at suitable intervals along the track with insulated sections varying in number, a signaling circuit arranged on the train and having means for electrically connecting it to said rails, and a signaling device connected in said circuit and responsive to impulses produced by the passage of the train over such insulated sections.

4. A signaling system for railways comprising a track divided into block sections and having current carrying rails extending along said track one of said rails being provided with insulated sections arranged at the beginning and end of each block section and varying progressively in number, a signaling circuit arranged on a train and having contact devices which travel along said current carrying rails, and a signaling device connected in such circuit and responsive to the impulses produced by one of said contact devices passing over the insulated sections.

5. A signaling system for railways comprising current carrying rails extending along the track, a pair of signaling circuits adapted to be carried by a train or vehicle having a series of contacts and a pair of signaling devices connected in circuit therewith, the contact devices being adapted to travel along said rails, a pole changer connected in each signaling circuit for reversing the polarity of its respective contact devices relatively to the source of current supply, and means located on or adjacent to the track for automatically setting said pole changer.

6. A signaling system for railways comprising current carrying rails extending along the track, a signaling circuit adapted to be carried by a train or vehicle having a source of current supply and a signaling device connected therein, contact devices arranged to travel along said rails, a pole changer connected in the signaling circuit for reversing the polarity between the terminals of the battery therein and the contact devices, and a device arranged on the track for alternately reversing the positions of the pole changers on trains following one another and moving in the same direction.

7. A signaling system for railways comprising current carrying rails extending along the track, a pair of signaling circuits adapted to be carried by each train or vehicle, each circuit being connected to a source of current supply and having a signaling device connected therein, contact devices connected to the terminals of the respective circuits and adapted to travel along said rails, and means for independently transmitting signals in pre-arranged groups through the respective circuits.

8. A signaling system for railways comprising traffic rails divided into insulated block sections, and a pair of current conducting rails extending parallel to such traffic rails and provided with insulated sections arranged in groups of varying numbers, a group of such insulated sections corresponding to each block section, a pair of signaling circuits adapted to be carried by each train, said circuits being connected to a source of current supply and provided with independent signaling devices, contact devices for electrically connecting said circuits to the track and conducting rails, a pole changer connected in each signaling circuit for reversing the polarity of its respective contact device, means arranged in the track for setting one of said pole changers in a given position on all trains passing in the same directions, and means arranged to coöperate with the other pole changer for setting the pole changers in reverse position on all trains passing such point moving in the same direction.

9. A signaling system for railways comprising current carrying rails extending along the track, a signaling circuit adapted to be carried by a train or vehicle having a suitable signaling device connected therein, contact devices arranged to coöperate with said rails, a pole changing switch for connecting said contact device to the terminals of said circuit, and a switch throwing device for said pole changer embodying a lever pivotally mounted on the track and having an incline to coöperate with an operating portion of said pole changer to reverse the position thereof, a device for locking said lever in either of two positions, and means carried by the train for unlocking said lever to permit the reversal of the position thereof, whereby the pole changer on a train following and moving in the same direction will remain inactive.

10. A signaling system for railways comprising current carrying rails extending along the track, a signaling circuit adapted to be carried by a train or vehicle having a suitable signaling device and a source of current supply connected therein, contact shoes connected to said circuit and adapted to travel along said rails, a pole changer for reversing the polarity of said shoes with respect to said circuit, a lever pivotally mounted on the track and having an inclined surface at one end to coöperate with a part connected to said pole changer for reversing the position of the latter, said lever also having an inclined surface on the opposite end thereof to coöperate with a part connected to a pole changer on a following train to reset said operating lever, and a guard arranged in advance of said lever for setting the operating parts of the pole changers in predetermined positions before encountering such lever.

11. A signal system for railways comprising a current carrying rail extending along the track, a signaling circuit adapted to be carried by a train and having a suitable signaling device connected therein and responsive to current impulses through such circuit, means on said current carrying rail for transmitting impulses through the signaling circuit on the train during the movement of the latter, one terminal of the signaling circuit being connected to one of the traffic rails, and circuit closing means operated by a switch point in the traffic rail for short-circuiting the signaling circuit on the train when the switch point is open.

12. A signaling system for railways comprising a pair of current conducting rails both divided into insulated block sections, a signaling circuit adapted to be carried by each train and having a signaling device connected therein, contact devices connected to the terminals of the signaling circuit and adapted to be electrically connected to the respective rails, and means for transmitting prearranged

groups of signals over said signaling circuit as the contact devices upon the train pass from one block section to another.

13. A signaling system for railways comprising a pair of current conducting rails both divided into insulated block sections, a signaling circuit adapted to be carried by a train and having a signaling device connected therein, contact devices in circuit with the signaling circuit and adapted to be electrically connected to the respective rails, and means for transmitting progressively varying groups of signals over said signaling circuit as the said contact devices pass from one block section to another.

14. A signaling system for railways comprising a pair of current conducting rails divided into insulated block sections, a signaling circuit adapted to be carried by a train and having a signaling device connected therein, contact devices connected to the respective terminals of the signaling circuit and adapted to traverse the respective rails, and prearranged groups of insulating sections arranged in one of said rails and adapted to coöperate with the respective contact device for transmitting prearranged signals over said signaling circuit as the train passes from one block section to another.

15. A signaling system for railways comprising a pair of current conducting rails divided into insulated block sections, the alternate sections being electrically connected and the adjacent sections insulated from one another, a signaling circuit adapted to be carried by a train and having a signaling device connected therein, contact devices connected to the respective terminals of the signaling circuit and adapted to traverse the respective rails, and means for transmitting prearranged groups of signals over said signaling circuit as the contact devices pass from one section to another.

16. A signaling system for railways comprising a pair of current conducting rails, a pair of signaling circuits adapted to be carried by a train, each circuit having a signaling device, pairs of contact devices connected to the terminals of the respective circuits and adapted to traverse said rails, a pole changer for each signaling circuit, a shiftable device arranged on the track for automatically setting one of said pole changers, means for locking said shiftable device in a predetermined position, and means upon the train for automatically unlocking said device to permit a shifting movement thereof.

17. A signaling system for railways comprising a pair of traffic rails and a pair of current conducting rails, said rails being divided into insulated block sections, and the current conducting rails being provided with predetermined groups of insulated sections, a pair of signaling circuits adapted to be carried by each train, a signaling device and a source of current supply connected in each of said circuits, a pole changer for each circuit, a shiftable operating device adapted to be arranged on the track for automatically reversing one of said pole changers during the passage of the train, means for locking said operating device from movement, and means upon the train for automatically unlocking said device to permit a reversal of its position.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JAMES T. WEST.

Witnesses:
A. M. PALMER,
P. W. WEST.