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W. MACOMBER.

RAILWAY SIGNALING APPARATUS.

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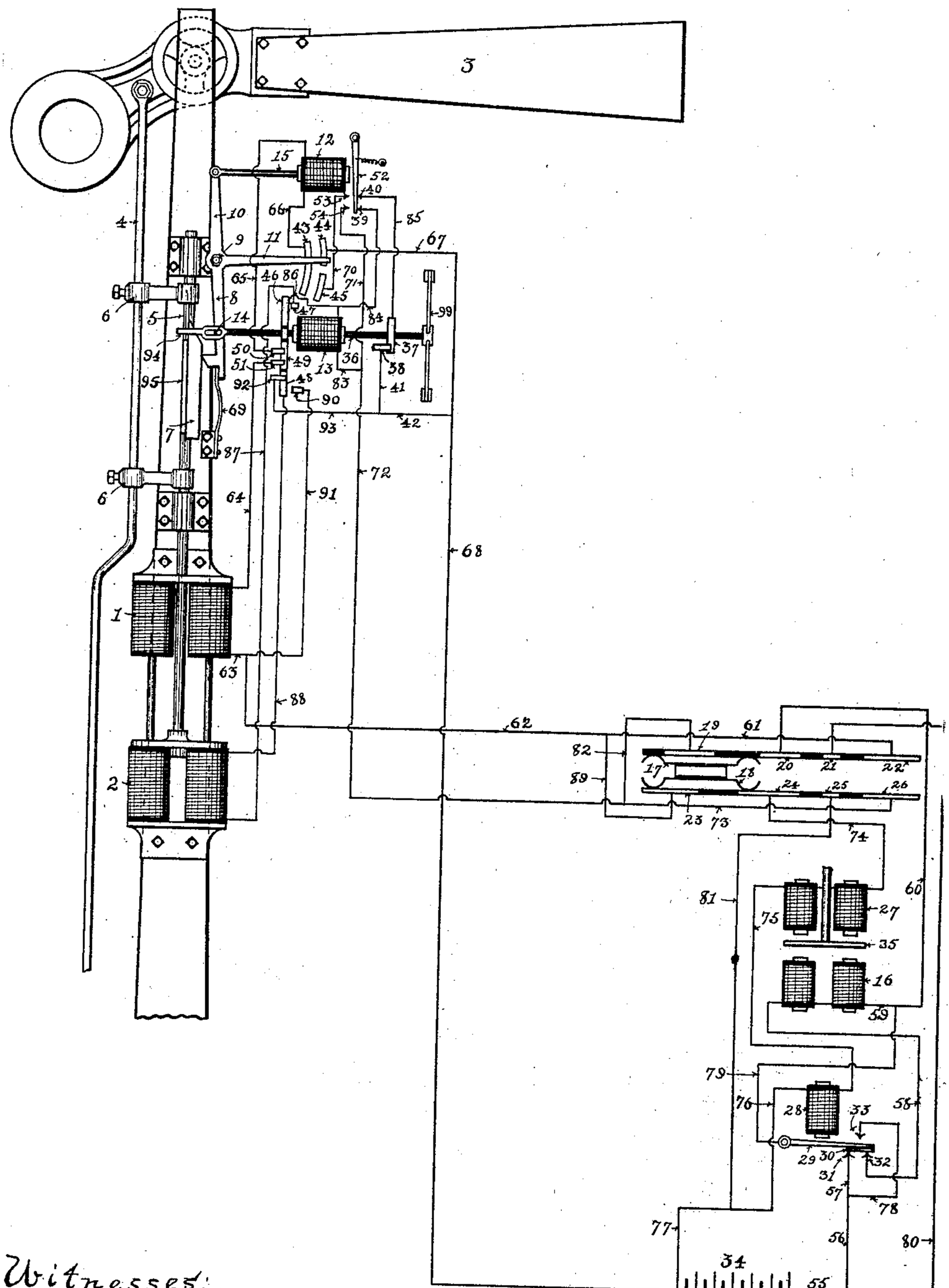

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RAILWAY SIGNALING APPARATUS.

No. 896,842. Specification of Letters Patent. Patented Aug. 25, 1908.

Application filed February 20, 1905, Serial No. 246,535. Renewed February 21, 1908. Serial No. 417,084.

To all whom it may concern:

Be it known that I, WILLIAM MACOMBER, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Railway Signaling Apparatus, of which the following is a specification.

My invention relates to railway signaling apparatus, and more particularly to signaling apparatus of the type actuated and governed by electric energy.

The object of my invention is to positively move, lock, give indication, unlock, return to normal, and give indication, by the application of electric energy from a single battery.

This invention is, furthermore, an improvement upon and directly related to the general, basic invention disclosed in my application Serial No. 198,220, filed March 15, 1904; and it is also directly related to the invention disclosed in my application filed February 20, 1905, Serial No. 246,534.

A further object of my invention is to employ the general means of my said former invention, and to render positive every movement or action of the signal, as above stated, and to overcome the defects heretofore existing wherein a signal has been held in its reverse position frictionally, in which there has been no indication when the signal has gone to reverse, and in which the return of the signal to normal has been wholly dependent upon gravity.

Referring to the drawing herewith, which is partly in elevation and partly diagrammatic, 1 is a four-pole solenoid for moving the signal to reverse. 2 is a similar solenoid for moving the signal to normal.

3 is a signal blade, and 4 is a rod pivoted to the signal blade shank. A short shaft 5 is slidably mounted in bearings which are secured to the signal post, and brackets 6, 6, rigidly secured to the shaft 5 are adjustably secured over the shaft 4. The lower end of the shaft 5 is rigidly secured to the common armature of the solenoids 1 and 2. Mounted upon the shaft 5 is a plate 7 which is rectangular at its lower end and beveled at an acute angle at its upper end. This plate 7 is rigidly secured to the shaft 5 and reciprocates with it. Pivoted at 9 upon the signal post is a lever arm 8, which is provided at its lower end with a latch capable of engaging under the square end of the plate 7. Integral with the lever 8 is a lever 10, which also swings upon the pivot 9 which is pivoted at its upper end to a rod 15, which rod 15, at its free end, constitutes an armature for the magnet 12 and is capable of being drawn into said magnet 12 when it is energized and the rod 15 is free to move. The arm 11 pivoted at 9, and also integral with the arms 8 and 10, acts as a snap-switch, as hereafter more fully described, being permanently in electrical connection with the contact plate 43, and alternately in electrical connection with the contact plates 44 and 45.

The armature rod of the magnet 13 extends through said magnet 13 and at its end adjacent to the arm 8 is provided with a slot 14, which takes over a pin in the arm 8. The slotted end 14 of the armature rod 36 of the magnet 13 has an extension 94 in the form of an L, (the L end extending directly backwardly so that it does not show in the drawing). A plate 95 is rigidly secured to the shaft 5 and at right angles to the plate 7. The plate 95 and the L-end 94 are so positioned that, when the armature of the magnet 13 is in its normal, medial position, the L-end 94 will lie out of plane (to the left in the drawing) of the plate 95, and so that, when the magnet 13 is energized to draw the rod 36 to its extreme (right hand) position, the L-end will lie in the plane of the plate 95. The upper end of said plate 95 stops a short distance below the L-end 94 when the signal is normal, and extends beyond the L-end when the signal is at reverse. The purpose of this arrangement is to delay indication until the signal is actually at normal, as will more clearly appear hereafter in tracing a movement. The outer end of armature rod 36 of the magnet 13 connects with springs 99 which tend to hold the armature of the magnet 13 in the normal position shown in the drawing, but which permit it to take the other positions at the proper time. Secured to the rod 36, but insulated from it is a contact plate 37, which makes electrical connection when in its normal position with the contact piece 38, and which breaks such connection as soon as the magnet 13 moves the rod 36. 52 is a tongue normally held out of contact with the core of the magnet 12 and in electrical connection with contacts 39 and 40, and when the magnet 12 is energized breaking connection with the contacts 39 and 40 and making connection with the contacts 53 and 54.

Mounted upon the armature of the magnet 13, but insulated from it is a plate 49 which makes electrical connection with the contacts 50 and 51 when the said armature is normal, and which breaks such contact as soon as said armature is moved out (to the right) of normal. 46 is a plate similarly mounted on said armature rod, capable of making electrical connection with the contact 47 as soon as the said armature is moved out of normal; and 48 is a plate similarly mounted and normally in electrical connection with the plate 92, but capable of breaking such connection and of making electrical connection with the contact 90 when said armature is moved to its extreme position by the release of the L-end 94 from the plate 95 as hereafter fully described.

17 and 18 are the brushes of the controller, the brush 17 making electrical connection with the contacts 19, 20, 21, and 22; and the brush 18 being capable of making electrical connection with the contacts 23, 24, 25, and 26.

27 are the indicating magnets; 16 are safety magnets; 28 is a cut-out magnet, and 29 is a tongue governed by said cut-out magnet 28 and carrying the insulated plate 30, which is normally in electrical connection with the contacts 31 and 32. When the magnet 28 is energized, the tongue 29 makes electrical connection with the contact 33.

34 is a source of electric energy.

The signal is shown in its normal or danger position, and the position of the mechanism corresponds to that position of the signal. I will now describe the movement of the signal to reverse and the "reverse indication." To produce this movement the brushes 17 and 18 are moved with the controller so that the brush 17 bridges the contacts 20 and 22, and the brush 18 bridges the contacts 24 and 26. This closes a circuit of the battery 34 including the solenoid 1, and the magnet 12, so that current flows from battery 34 through wires 55, 56, 57, contact 31, plate 30, contact 32, wire 58, safety magnets 16, wires 59, 60, contact 20, brush 17, contact 22, wires 61, 62, 63, solenoid 1, wire 64, contact 51, plate 49, contact 50, wire 65, magnet 12, wire 66, contact 43, arm 11, contact 44, wires 67, 68, back to battery. This energizes the solenoid 1, causing it to force the rod 5 upwardly and through the brackets 6, 6, and the rod 4, to carry the signal blade 3 downwardly to reverse or safety position, and at the same time the plate 7 is carried upwardly along with the rod 5. The current passing through the magnet 12 energizes said magnet and tends to draw the armature rod 15 inwardly and at the same time moves the armature 52 against the retractile spring up against the end of the magnet 12, breaking contact with 39 and 40 and making contact with 53 and 54. The current in passing from battery through safety magnets 16 has energized them and produced the release of the controller, as fully described in my said pending application Serial No. 198,220. As soon as the rod 5 has carried the plate 7 upwardly sufficiently for the hook end of the arm 8 to engage over the end of the plate 7, the magnetic action of the magnet 12 upon the bar 10 will overcome the tension of the spring 69 and cause the hook end of the arm 8 to snap to place underneath the plate 7. This will lock the signal in the reverse position. The tongue 52 having moved to contact, as above described, the throw of the arm 8 into lock will carry the arm 11 downwardly and cause it to make electrical connection between the plate 43 and the plate 45. Current will then flow from the battery through the path just above described to the point of union of the wire 66 with the plate 43, and from thence it will flow from plate 43 through arm 11, plate 45, wire 70, contact 53, tongue 52, contact 54, wires 71, 72, 73, contact 26, brush 18, contact 24; wire 74, indicating magnets 27, wire 75, cut-out magnets 28, wires 76, 77, back to battery. This current passing through the indicating magnets 27 and cut-out magnets 28 will shunt the battery current through wire 78, contact 33, tongue 30 and wire 79, around the safety magnets 16, permitting the final movement of the controller giving indication that the signal is at reverse and locked, as fully described in my aforementioned patent. The final movement of the controller will cause the brush 17 to bridge contacts 21 and 22 instead of 20 and 22, and will cause the brush 18 to bridge the contacts 25 and 26, so that current will flow from battery 34, through wires 55, 80, contact 21, brush 17, contact 22, and thence through the path last above described, to the signal and back through the indicating wire to contact 26, brush 18, contact 25, and wires 81 and 77 back to battery. This carries the current outside of all magnets on the controller so that the signal may be held at reverse independently of the movement of any other unit of the system, and independently of any cross which may occur after the signal had gone to reverse, as fully described in my said pending application Serial No. 198,220. The signal will remain in this reverse position as long as the current remains on, but if for any reason there should be a break in the circuit so that the magnet 12 should be deënergized, the spring 69 would retract the hook end of the bar 8 from underneath the plate 7 and allow the signal blade 3 to go to danger by gravity; and the disturbance of the circuit would be at once discovered by the operator upon the next attempted movement of the signal.

I will now describe the movement of the signal to normal.

The controller is moved so that the brush

17 bridges the contacts 19 and 20, and the brush 18 bridges the contacts 23 and 24. This establishes a circuit of the battery 34 and magnet 13 so that current flows through wires 55, 56, 57, contact 31, plate 30, contact 32, wire 58, safety magnets 16, wires 59, 60, contact 20, brush 17, contact 19, wires 82, 72, 83, magnet 13, wire 84, contact 39, tongue 52, contact 40, wire 85, plate 37, contact 38, and wires 41, 42, 68, back to battery. This energizes the safety magnets to cause the release of the controller, as above stated, and also energizes the magnet 13. The movement of the controller just described having deënergized the magnet 12, the magnet 13 will draw the rod 36 and cause it to supplement the action of the spring 69 and force the removal of the hook end of the arm 8 from engagement with the plate 7, if for any reason the spring 69 has failed to produce that release.

Immediately the magnet is energized, the L-end 94 will be drawn up against the side of the plate 95, electrical connection will be broken between 37 and 38, and 50 and 51, and the plate 46 will be put in electrical connection with the contact 47. Current will then flow through the path just described to the magnet 13 and through the magnet 13 to the wire 86, plate 46, contact 47, wire 87, solenoid 2, wire 88, plate 48, contact 92, and wires 93, 42, 68 back to the battery. This current will continue to energize the magnet 13 and will energize the solenoid 2, which will compel the movement of the signal to normal, if for any reason it fails to move by gravity. (In fact, with my construction, only a slight counterweight effect is necessary).

As soon as the signal blade has reached its normal position, the L-end 94 will be released by the downward movement of the plate 95, and the magnet 13 will move its armature to the extreme position, moving the plate 48 out of electrical connection with contact 92 and into electrical connection with the plate 90. This will shunt the battery current from the path back to the battery through the common return wire 68, through contact 90, wires 91, 62, 89, contact 23, brush 18, contact 24, wire 74, indicating magnets 27, wire 75, cut-out magnet 28, and wire 77 back to battery. This will give indication that the signal is at normal, and, as described in my aforementioned patent, will cause the final movement of the controller, and cut off the battery current between the contacts 19 and 20.

As soon as the magnet 13 is deënergized by the final movement of the controller, the springs 99 will restore the armature to normal and make the electrical connections controlled by the movement of the armature rod 36 for the next movement.

It will of course be understood that I may employ a motor and gearing and secondary field windings instead of the solenoids for moving the signal without departing from the spirit of my invention; but I prefer the use of solenoids, as they are less liable to be troubled by frost and ice. It will thus be seen that both movements of the signal are positive and the locking and unlocking positive. Experience has demonstrated the necessity of such positive action, especially in climates subject to frost and ice.

While I do not limit myself to the specific construction shown, what I claim broadly is:—

1. In combination with a signal and a source of electric energy, means for moving the signal to reverse, means for locking the signal at reverse, means for indicating such condition, means for holding the signal locked, means for unlocking the signal, means for forcing the signal to normal, and means for indicating the return of the signal to normal, all of said means being actuated by said source of electric energy.

2. In combination with a signal, a source of electric energy, means for moving the signal, a controller, an operating wire, an indicating wire, a return wire, electro-magnetically actuated means for locking the signal at reverse and electro-magnetically actuated means for unlocking the signal to allow it to go to normal by gravity when current is cut off from the electro-magnetic means for locking the same.

3. In combination with a signal, a source of electric energy, means for moving the signal, a controller, an operating wire, an indicating wire, a return wire, electro-magnetic means for locking the signal at reverse, and electro-magnetic means for unlocking the signal to allow it to go to normal by gravity when current is cut off from the electro-magnetic means for locking the same, and means for compelling the return of said signal to normal in case of its failure to move by gravity.

4. In combination with a signal, a source of energy, means for moving the signal, a controller, an operating wire, an indicating wire, a return wire, electro-magnetic means for locking said signal at reverse, an indicating device and means for shunting the battery current from said return wire through said indicating device when the signal is locked at reverse, and means for unlocking said signal when said controller is moved toward normal, and means for indicating the return of said signal to normal.

5. In combination with a signal, a source of energy, means for moving the signal, a controller, an operating wire, an indicating wire, a return wire, electro-magnetic means for locking said signal at reverse, an indicating device and means for shunting the battery current from said return wire through

said indicating device when the signal is locked at reverse, and electro - magnetic means for unlocking said signal, means for compelling the movement of the signal to normal, and means for causing indication when said signal has been fully moved to normal.

6. In combination with a signal, a source of energy, means for moving the signal, a controller, an operating wire, an indicating wire, an indicating device, a return wire, a magnet cut into said operating wire, a latch actuated by said magnet to lock said signal at reverse, a snap switch actuated by said latch to shunt the battery current from the return wire to the indicating device when the latch has locked the signal at reverse, a magnet capable of moving said latch out of lock when energized, and means for sending battery current through said magnet to cause the release of said signal.

7. In combination with a signal, a source of energy, means for moving the signal, a controller, an operating wire, an indicating wire, an indicating device, a return wire, a magnet cut into said operating wire, a latch actuated by said magnet to lock said signal at reverse, a snap switch actuated by said latch to shunt the battery current from the return wire to the indicating device when the latch has locked the signal at reverse, a magnet capable of moving said latch out of lock when energized, and means for sending battery current through said magnet to cause the release of said signal and an electric switch actuated by said last mentioned magnet to shunt the battery current through a solenoid or a motor when said latch has released said signal.

8. In combination with a signal, a source of electric energy, a controller, operating and indicating wires, a return wire, an indicating device, a solenoid for moving the signal to reverse, a solenoid for moving the signal to normal, a latch, a snap switch, a magnet actuating said latch to lock the signal at reverse and for shunting the current from the return wire to the indicating wire, a magnet for moving said latch out of lock, a circuit for closing said last mentioned magnet with the battery, an electric switch actuated by the armature rod to close the solenoid for moving the signal to normal with said battery, and a second electric switch actuated by said magnet to shunt the current from the common return through the indicating wire when the signal has gone to normal.

9. In combination with a signal, a source of electric energy, solenoids, a controller, operating and indicating wires, a common wire, a safety magnet, an indicating magnet, a cut-out magnet, a latch for locking the signal at reverse, a snap switch, a magnet for actuating said latch to produce locking and to throw said snap switch in the direction to shunt the operating current from the return wire to the indicating wire, to energize said cut-out magnet and said indicating magnet to produce the final throw of the controller, a magnet for moving said latch to unlock said signal and to reverse said snap switch and electric switches actuated by said last named magnet to shunt the battery current from the return wire through one of said solenoids to compel movement of said signal to normal, and to shunt the current through indicating wire to cause final return movement of said controller.

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

WILLIAM MACOMBER.

Witnesses:

A. W. MACOMBER,

E. F. BRANCH.