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W. MACOMBER.

RAILWAY SWITCHING APPARATUS.

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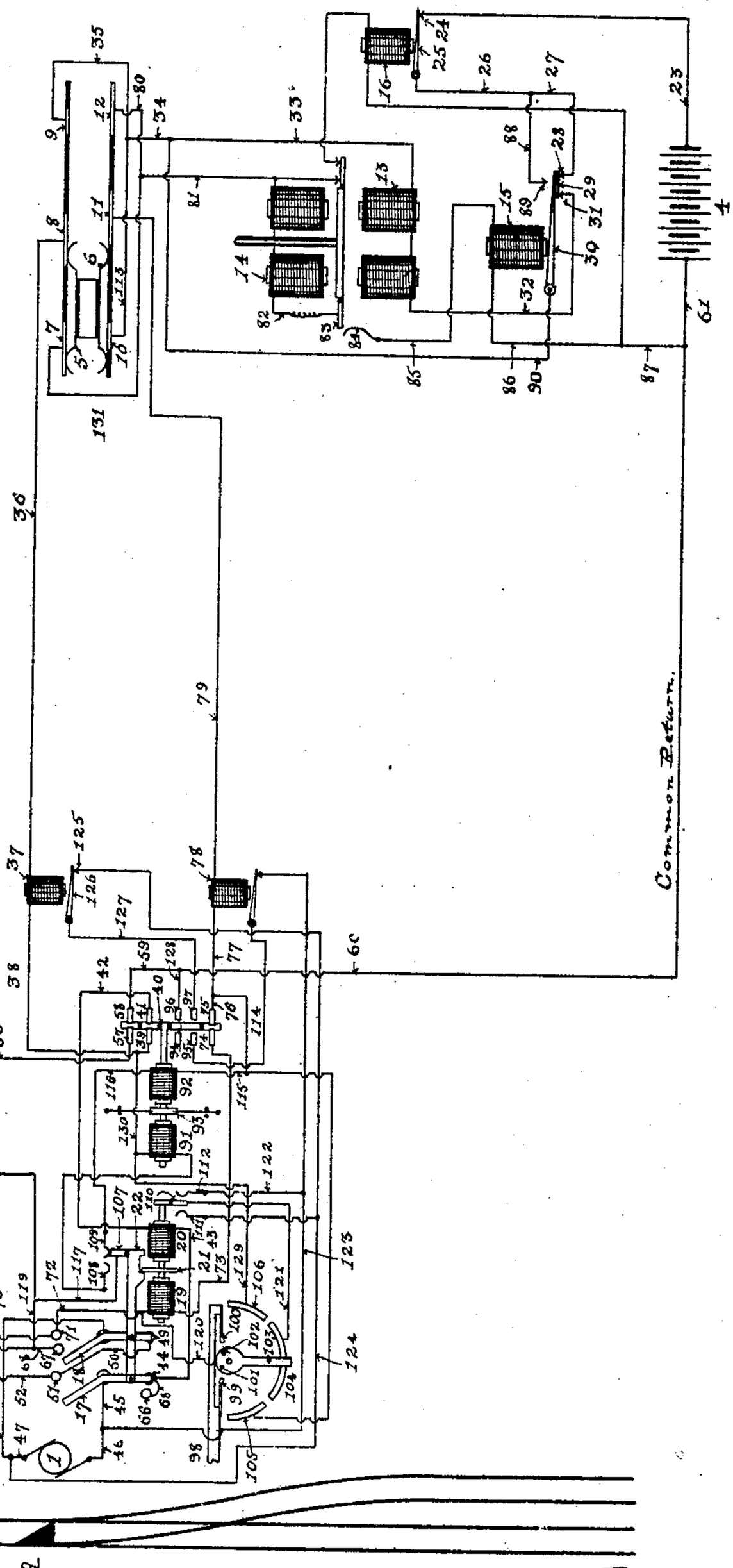

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UNITED STATES PATENT OFFICE.

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RAILWAY SWITCHING APPARATUS.

No. 832,139. Specification of Letters Patent. Patented Oct. 2, 1906.

Application filed February 20, 1905. Serial No. 246,537.

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 Improvement in Railway Switching Apparatus, of which the following is a specification.

My invention relates to railway switching apparatus, and more particularly to apparatus in which the motive power is electricity.

The object of my invention is to provide means whereby the rail-switch may be returned to its initial position at any time after a movement has been begun and before the switch has gone to full reverse and been locked. The reason for the employment of this mechanism is that it frequently happens that the rail-switch may be clogged by snow or ice or other obstacle, preventing it from going to the desired position, and it is necessary under these circumstances that means be employed by which the switch can be returned to its initial position and not left in an intermediate position, and it is also essential that means may be provided whereby the switch may be moved back and forth from its initial position perhaps a number of times until the obstacle is crowded out and the switch goes to full reverse.

To this end my invention employs the general mechanism and construction shown and described fully in my pending applications, Serial Nos. 198,220 and 246,535, in which the general mechanism herein employed is so fully disclosed as to require no detailed explanation in this specification.

Referring to the diagram of the drawings herewith, A represents the rail-switch which is to be operated by the motor, comprising the armature 1, the field 2, and the secondary field-winding 3. 4 is a source of electric energy. 5 and 6 are the brushes of a controller capable of bridging the contacts 7 8 9 and 10 11 12, respectively. 13 represents the safety-magnets. 14 represents indicating-magnets. 15 is a cut-out magnet. 16 is a cut-out magnet for cutting off the operating-wire in the event of a cross. 17 and 18 are the two arms of a pole-changing switch. 19 and 20 are magnets governing a common armature 21, which engages the bar 22, pivoted to the pole-changing switch for the purpose hereinafter more fully described. These are the normal parts of a switching apparatus as disclosed in my said aforementioned patents.

I will first describe a normal movement of the rail-switch A. Assume that it is desired to reverse the switch A. The controller is moved so that the brush 5 bridges the contacts 8 and 9, and the brush 6 bridges the contacts 11 12. This closes a circuit of the battery including the switch-motor, so that current flows from battery 4 through wire 23, contact 24, tongue 25, wires 26 27, contact 28, insulated plate 29 on tongue 30, contact 31, wire 32, safety-magnets 13, wires 33 34 35, contact 9, brush 5, contact 8, wire 36, magnet 37, wire 38, contact 39, bar 40, contact 41, wire 42, magnet 20, wire 43, contact 44, switch-arm 17, wires 45 46, armature 1, wires 47 48, switch-arm 18, contact 49, wire 50, contact 51, wire 52, field-coils 2, wire 53, magnet 54, wires 55 56, contact 57, bar 40, contact 58, wires 59 60 61 back to battery. This energizes the magnets 13 and causes the release of the controller-bar, as fully described in my aforementioned patents. It also energizes the magnet 20 and draws the armature 21 against its core, so that said armature 21 will engage the notch in the bar 22 to permit only a half-throw of the pole-changing switch for the purpose about to be described. This current will also energize the motor and cause it to move the rail-switch. It also energizes the magnet 54, causing its tongue 62 to break electrical connection between the wires 63 and 64, for the purpose hereinafter described. When the rail-switch has completed its movement and has gone home and been locked, the bar 22 will be impelled by the spring described in my aforementioned patents, and the pole-changing switch will make a half-throw, so that the arm 17 will break electrical connection with the contact 44 and make electrical connection with the contact 66, and the arm 18 will break electrical connection with the contact 49 and will make electrical connection with the contact 67. Current will then flow from the battery through the path above described to the contact 44 and from there will flow through the wires 68 to the contact 66. From thence the current will flow through the arm 17, wires 45 46, armature 1, wires 47 48, switch-arm 18, con-

tact 67, wires 68 69, secondary winding 3, wires 70, contact 71, wire 72, magnet 19, wire 73, contact 74, bar 40, contact 75, wires 76 77, magnet 78, wire 79, contact 11, brush 6, contact 12, wires 80 81, indicating-magnet 14, flexible connection 82, plate 83, brush 84, wire 85, cut-out magnet 15, wires 86 87 61, back to battery. This current flowing through the secondary winding 3 will act as a brake upon the motor. The current passing through the magnet 15 will cause it to raise the tongue 30 and break electrical connection between the two contacts 28 31 and cause the current to be shunted around the safety-magnets 13 through wire 88, contact 89, tongue 30, and wire 90 to wire 34. This will result in deënergizing the safety-magnets and permitting the indicating-magnets to produce final movement of the controller. At the same time the current will have continued to energize the magnet 20, and while the magnet 19 has also been energized, the armature 21, having been previously moved out of the field of magnet 19, current flowing through the magnet 19, will not cause the armature 21 to be moved out of contact with the core of magnet 20. As soon as the brushes 5 and 6 have been moved to their final reverse position, cutting off the current between the contacts 8 and 9, the magnets 19 and 20 being both deënergized, the spring actuating the bar 22 will cause the final throw of the switch-arms 17 18, so that the arm 17 will make electrical connection with the contact 51 and the arm 18 will make electrical connection with the contact 71 ready for the next movement. Since a movement of the switch in the opposite direction will be substantially the same, it need not be described, the only difference being that the magnet 19 instead of the magnet 20 would be energized in the first instance.

Now suppose that for some reason after a movement such as I have just described has been attempted the rail-switch should refuse to go home so that it can be locked. Unless some special means are provided the operator is helpless and can do nothing but set the signals at "danger" (unless they are already so set) and stop business until the obstacle has been removed. This may cause an unnecessary and vexatious delay, whereas if means are provided by which the switch may be moved back and forth a few times the obstacle may be removed and delay avoided. To accomplish this end, I provide the magnets 91 and 92, which govern a common armature 93, which is spring-held in the middle position between said magnets 91 and 92. The common armature-rod of these two magnets connects with the bar 40, which is capable of making electrical connection between the contacts 94 and 95 in one extreme position, making electrical connection between the contacts 96 and 97 in the other extreme position, and of making electrical connections between the contacts 57 and 58, 39 and 41, and 74 and 75 in its middle or normal position, and of breaking electrical connection between said last-mentioned set of contacts when in either extreme position. The magnets 37 and 78 are cut into the two wires operating alternately as operating and indicating wires for the purpose hereinafter more fully described. The bar 98 is moved in one direction or the other by the bar connected with it, which cocks the spring of the pole-changing switch. This bar 98 carries lugs 99 and 100, mounted upon springs, which lugs are capable of engaging, respectively, the pins 101 and 102 upon switch-arm 103. The switch-arm 103 is capable of making electrical connection in its medial position with the contact 104 and in its two extreme positions with the contacts 105 or 106. The bar 22 carries the insulated contact 107, which is capable of making electrical connection with the brushes 108 or 109, according to the position of the bar 22. Mounted upon and insulated from the armature-rod of the magnets 19 and 20 is a contact-piece 110, which is capable of making electrical connection with the brushes 111 or 112, according to the position of the armature 21.

Suppose now the attempted movement has been made and the brushes 5 and 6 bridge the contacts 8 9 and 11 12 and the switch refuses to go home and lock. The operator reverses the controller; but, as fully described in my aforesaid pending application, Serial No. 198,220, the lug on the controller will engage the roller of the armature-rod of the safety and indicating magnets and will not permit the controller-bar to be placed in its initial position. It will, however, move to a position to permit the brushes 5 and 6 to bridge the contacts 7 8 and 10 11, respectively. With such reversal of the controller current will flow from battery 4 through wire 23, contact 24, tongue 25, wires 26 27, contact 28, insulated plate 29, contact 31, wire 32, safety-magnets 13, wires 33 34 113, contact 10, brush 6, contact 11, wire 79, magnet 78, wires 77 114 115, magnet 92, wire 116, brush 109, contact 107, wires 117 64, tongue 62, contact 118, wires 63 56, contact 57, bar 40, contact 58, wires 59 60 61, back to battery. This current will energize the magnet 92 and cause it to draw the spring-held armature 93 and cause the bar 40 to break electrical connection between contacts 57 58 39 41 and 74 75 and to make electrical connection between the contacts 96 and 97. As soon as the bar 40 is thus moved current continues through the magnet 92 from the battery through the path just traced and from thence flows through wire 116, brush 109, contact 107, wires 117 119 69, secondary field-winding 3, wire 70, contact 71, wires 72 120, switch-arm 103,

contact 104, wire 121, contact 110, brush 112, (since the armature 21 has been previously moved to put 110 and 112 in contact,) wires 122 123 46, armature 1, wire 124, contact 125, tongue 126, wire 127, contact 97, bar 40, contact 96, wires 128 60 61, back to battery. This current passes through the secondary field 2 and the armature 1 in the direction to move the rail-switch back to the position it occupied before movement was attempted and failure to go home eventuated. As soon as the switch-rail is thus finally moved back and the locking-bolt has gone to place the bar 98 is moved, so that the lug 100 engages the pin 102 and swings the switch-arm 103 out of contact with the plate 104 and into contact with 106. This will shunt the current from the path back through the common return above described to wires 129 130 38, magnet 37, wire 36, contact 8, brush 5, contact 7, wires 131 81, indicating-magnets 14, connection 82, plate 83, brush 84, wire 85, cut-out magnet 15, wires 86 87 61, back to battery 4. This will produce indication as above described and restore the controller to the original position.

The switch 103 is always returned to contact with the plate 104 in the initial movement unlocking the rail-switch, so that it is in position for action if any movement of the switch has taken place.

The magnet 54 prevents a normal return-current from passing through the wires 63 64, which might produce a false indication.

The magnets 37 and 78 control the current to the armature 1, where a reverse movement is made.

As soon as a reverse movement is completed the battery-current is broken at the controller, and the armature 93 returns to its normal medial position, restoring the bar 40 to position for the next regular movement.

If it were desired to produce a reverse movement in the opposite direction from that above described, the magnet 91 would be energized, moving the bar 40 to break the connections, as above described, and making electrical connections between the contacts 94 and 95. Under those circumstances the plate 107 would be in contact with the brush 108, and the plate 110 would have been put in contact with brush 111 by the regular movement to reverse the rail-switch.

The direction of current through the secondary field 2 would be the same as before, but it would pass in reverse direction through the armature 1.

The switch-arm 103 to produce indication would make contact with plate 105 instead of plate 106; otherwise the operation would be substantially the same as above described.

Having thus described my invention and its method of operation, what I claim is—

1. In a railway switching apparatus, in combination with a source of energy, a controller, two wires leading from said controller to rail-switch mechanism acting alternately as operating and indicating, an indicating device, a common return-conductor, a motor and mechanism for moving the rail-switch, means for reversing the direction of rotation of said motor corresponding to the alteration of function of said two wires, and means for reversing the direction of rotation of said motor before the completion of a movement comprising means for reversing the functions of said two wires through the controller, an electromagnetically-actuated electric switch and wires and contacts for connecting the wire connected to battery on reversal to common through said switch and said motor in such direction as to reverse its motion in rotation to return the rail-switch to initial position, and a mechanically-operated electric switch for shunting the battery-current from common to indicating when said rail-switch has returned to its initial position.

2. In a railway switching apparatus, in combination with a source of energy, a controller, two wires leading from said controller to rail-switch mechanism acting alternately as operating and indicating, an indicating device, a common return-conductor, a motor and mechanism for moving the rail-switch, means for reversing the direction of rotation of said motor corresponding to the alteration of function of said two wires, and means for reversing the direction of rotation of said motor before the completion of a movement comprising means for reversing the functions of said two wires, an electric switch including both of said wires, magnets for operating said electric switch, wires connecting each of said wires alternately as operating and indicating wires through said magnets actuating said electric switch, a selector-contact connecting said wires including said magnets with common return, reversing-wires leading from said switch through said motor in reverse directions to common, and contacts on said switch for connecting the reverse operating-wire through said switch with one of said reversing-wires.

3. In a railway switching apparatus, in combination with a source of energy, a controller, two wires leading from said controller to rail-switch mechanism acting alternately as operating and indicating, an indicating device, a common return-conductor, a motor and mechanism for moving the rail-switch, means for reversing the direction of rotation of said motor corresponding to the alteration of function of said two wires, and means for reversing the direction of rotation of said motor before the completion of a movement comprising means for reversing the functions of said two wires, an electric switch including both of said wires, magnets for operating said electric switch, wires connecting each of said wires alternately as operating and indicating

wires through said magnets actuating said electric switch, a selector-contact connecting said wires including said magnets with common return, reversing-wires leading from said switch through said motor in reverse directions to common, and contacts on said switch for connecting the reverse operating-wire through said switch with one of said reversing-wires, and a mechanically-operated electric switch for shunting the operating-current from common to said reverse indicating-wire and said indicating device when the rail-switch has been brought to its initial position.

4. In a railway switching apparatus, in combination with a source of energy, a controller, two wires leading from said controller to rail-switch mechanism acting alternately as operating and indicating, an indicating device, a common return-conductor, a motor and mechanism for moving the rail-switch, means for reversing the direction of rotation of said motor corresponding to the alteration of function of said two wires, and means for reversing the direction of rotation of said motor before the completion of a movement comprising means for reversing the functions of said two wires, an electric switch including both of said wires, magnets for operating said electric switch, wires connecting each of said wires alternately as operating and indicating wires through said magnets actuating said electric switch, a selector-contact connecting said wires including said magnets with common return, reversing-wires leading from said switch through said motor in reverse directions to common, and contacts on said switch for connecting the reverse operating-wire through said switch with one of said reversing-wires, and a mechanically-operated electric switch for shunting the operating-current from common to said reverse indicating-wire and said indicating device when the rail-switch has been brought to its initial position, and means for restoring the normal circuits by restoring said electric switch including said two wires, alternately operating and indicating, to its normal position after indication that the rail-switch is locked.

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

WILLIAM MACOMBER.

Witnesses:
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