No. 814,537. PATENTED MAR. 6, 1906.

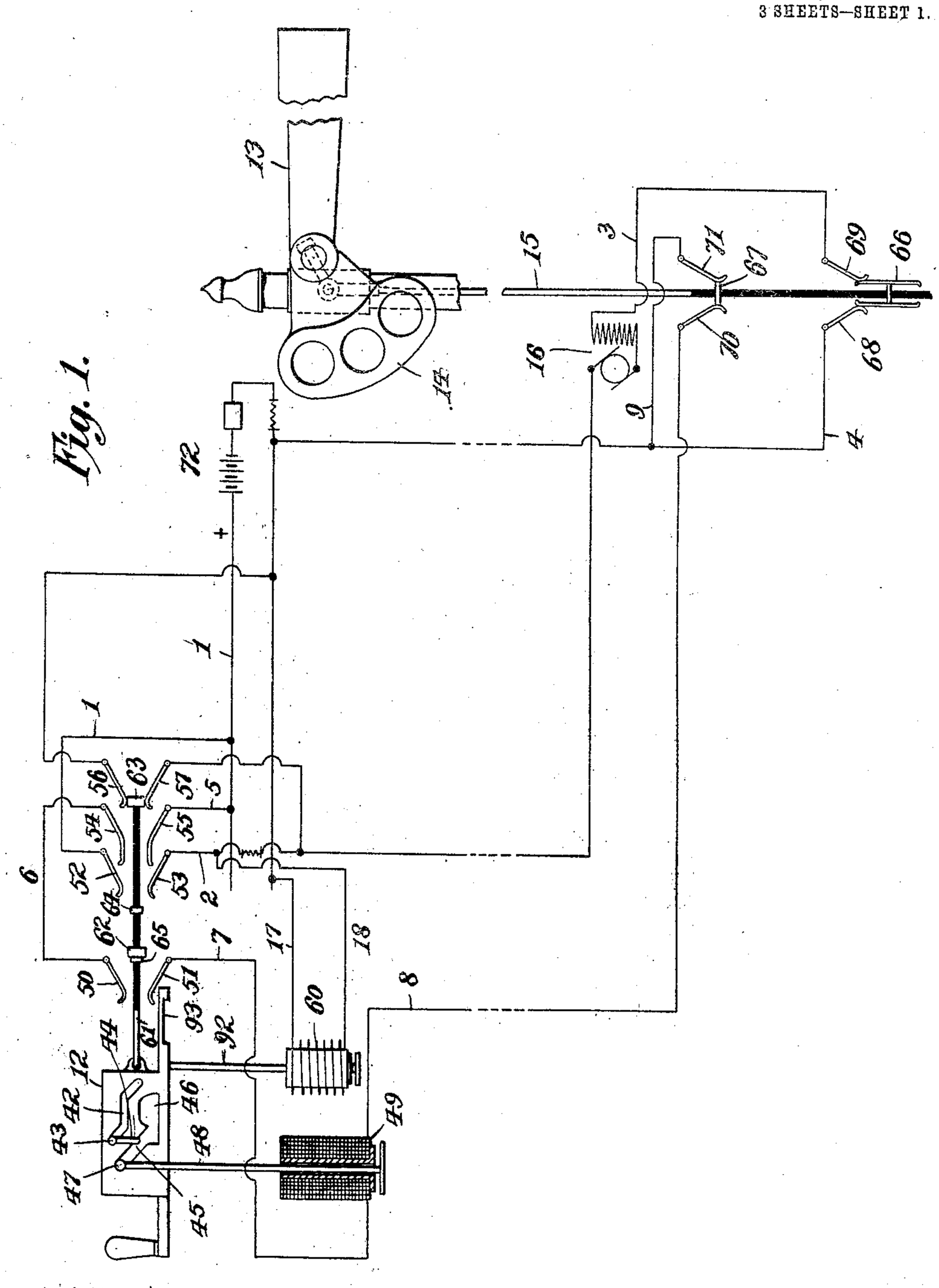
L. GRIFFITH.

SAFETY DEVICE FOR RAILWAY SWITCH AND SIGNAL APPARATUS.

APPLICATION FILED SEPT. 20, 1905.

3 SHEETS—SHEET 1.

Fig. 1.



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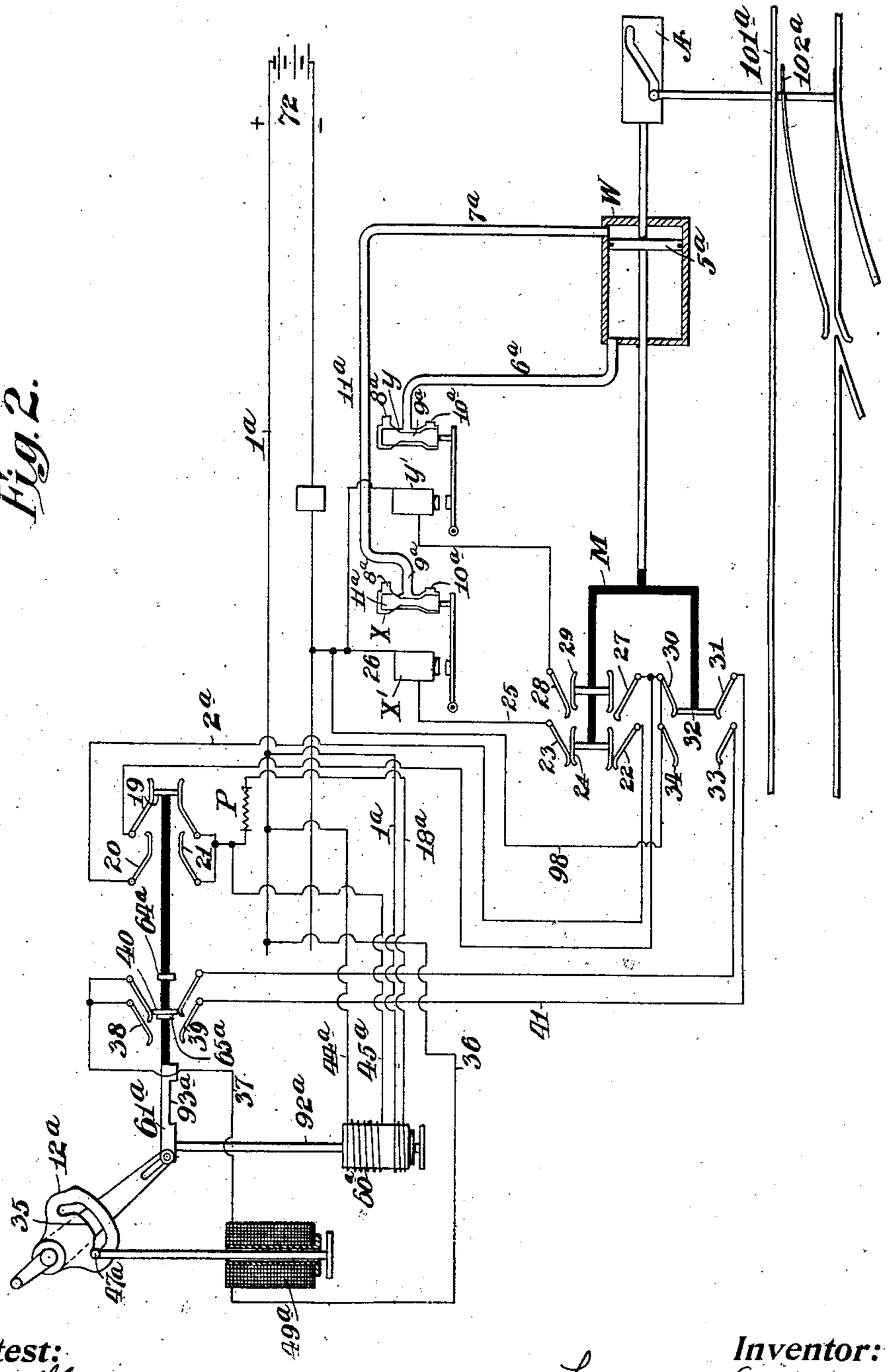
3 SHEETS—SHEET 2.

Fig. 2.



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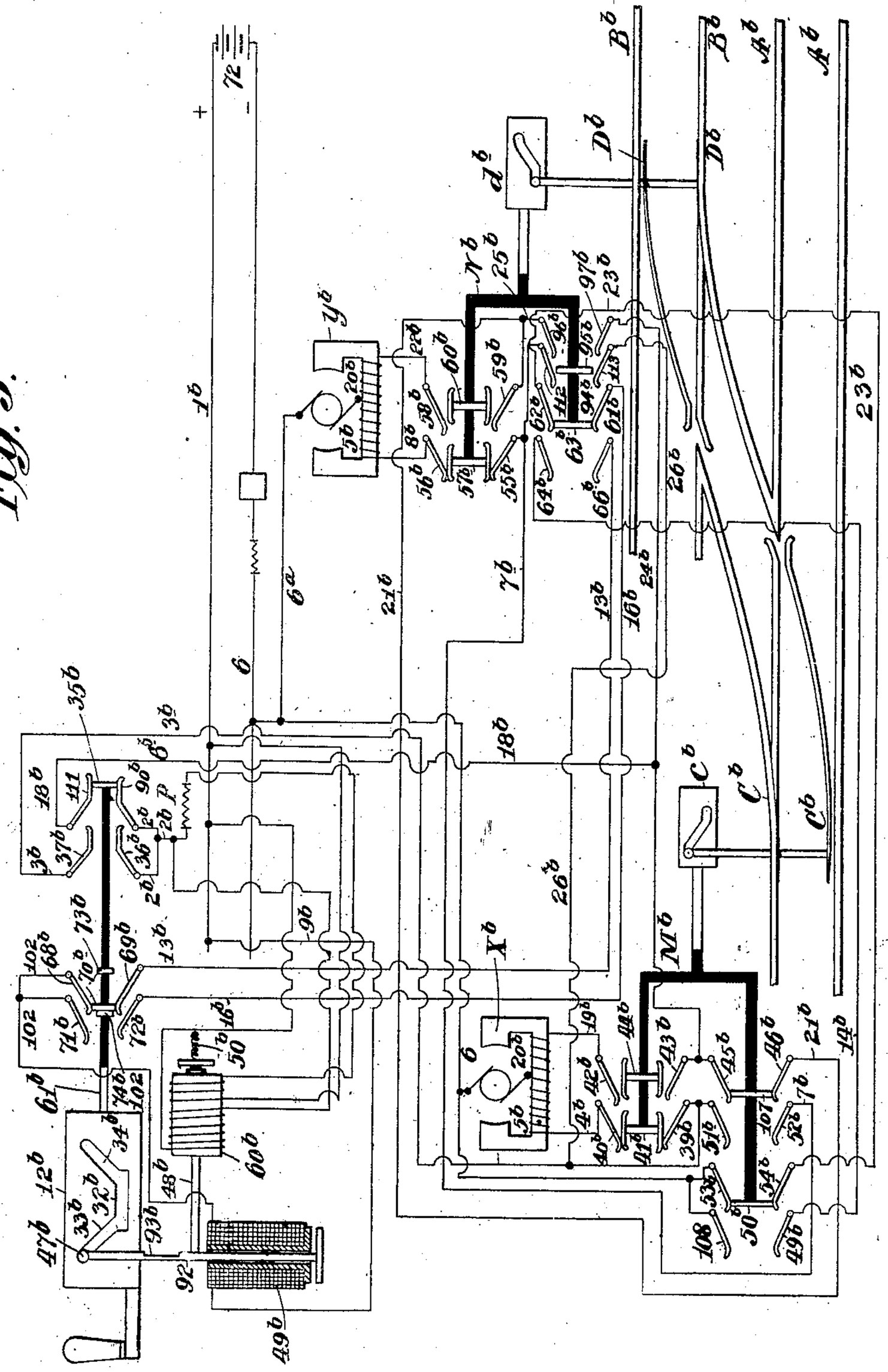
3 SHEETS—SHEET 3.

Fig. 3.



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UNITED STATES PATENT OFFICE.

LAWRENCE GRIFFITH, OF YONKERS, NEW YORK.

SAFETY DEVICE FOR RAILWAY SWITCH AND SIGNAL APPARATUS.

No. 814,537. Specification of Letters Patent. Patented March 6, 1906.

Application filed September 20, 1905. Serial No. 279,332.

To all whom it may concern

Be it known that I, LAWRENCE GRIFFITH, a citizen of the United States of America, residing in the city of Yonkers, county of Westchester, and State of New York, have invented certain new and useful Improvements in Safety Devices for Railway Switch and Signal Apparatus, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to railway switch and signal apparatus; and its objects are to provide safety devices for the same.

To these ends, my invention consists, broadly, of means whereby the apparatus or a part thereof may be locked at certain times.

Reference may be had to United States Letters Patent No. 724,180, granted to me March 31, 1903; No. 776,238, granted to me November 29, 1904, and to my pending applications, Serial No. 151,578, filed April 8, 1903; Serial No. 230,360, filed October 28, 1904; Serial No. 231,514, filed November 5, 1904, and Serial No. 231,515, filed November 5, 1904.

In order that my invention may be clearly understood, I shall first describe in detail the manner in which I carry the same into practice and then point out the novel features of the invention in the claims, reference being had to the accompanying drawings, forming part of the specification, in which similar characters of reference indicate similar parts in all the vews, of which—

Figure 1 is a diagrammatic view of my invention as applied to an electrically-operated semaphore; Fig. 2, a similar view as applied to electrically-controlled pneumatically-operated switch-points, and Fig. 3 a similar view as applied to a pair of electrically-operated switch-points or a crossover.

In Figs. 1 and 3 I have shown my invention in combination with an operator's stroke-completing bar, and in Fig. 2 in combination with an operator's locking-quadrant.

Referring now to Fig. 1, 12 is the operator's bar or lever in the tower, and 13 the semaphore-blade. The semaphore-blade is normally held at "danger" by the counter-weight 14 and is turned to "safety" by the upward movement of the rod 15. Said rod is actuated by electric motor 16. As the motor need move the rod 15 in only one direction, a single-wound motor may be used. It will be understood that suitable devices known to the art are employed for connecting the motor with rod 15. The operator's bar 12 may have the ordinary tappet-slot 42, which coöperates with a roller 43, attached to the tappet 44, working in the ordinary interlocking board. Another slot in the bar 12 has the inclined portion 45 and the horizontal portion 46. In this slot is a roller 47, connected by rod 48 with the armature of indicating-solenoid 49 or other electric unit. Fastened to the frame which supports the bar 12 and insulated therefrom are four pairs of contact-springs, as follows: 50 and 51, 52 and 53, 54 and 55, 56 and 57. Fastened to and coöperating with the bar 12 is the rod 61. Bridge 63 is securely fastened to rod 61 and moves with it. Bridge 62 is loosely attached to rod 61 and is moved by the stops 64 and 65 coming in contact with it. Motor 16 is operatively connected with rod 15, so as to raise said rod as said motor revolves. Attached to and coöperating with said rod 15 are two bridges 66 and 67, bridge 66 being adapted to make and break the circuit between the contact-springs 68 and 69 and bridge 67 being adapted to make and break the circuit between the contact-springs 70 and 71. It will be understood that means well known to the art are employed to maintain the rod 15 in its elevated position, and therefore the semaphore-blade at 15 at "safety" until the operator breaks the electric connection holding said rod and semaphore-blade in that position or otherwise release them. It is very important that the indicating-solenoid or electric unit 49 be not allowed to act while there is current on the circuit of the motor 16. To this end the safety-magnet or electric unit 60 is connected in parallel with the circuit of motor 16 by wires 17 and 18, and it will be understood that the circuit through said safety-magnet is made and broken by bridge 63, coöperating with contact-springs 52 and 53, so that when current is supplied to motor 16 by wire 2 current will also be supplied to safety-magnet 60, energizing the same and raising its armature, and with it rod 92, which rod 92 coöperates with notch 93 on bar 12, so as to lock the same against the action of solenoid or indicating-magnet 49. In other words, the indicator 49 is mechanically locked while energy is supplied to the motor 16. From any suitable source 72 of electric energy, which may be a primary battery, a storage battery, or a dynamo, a

positive common wire 1 connects with contact spring 52. From contact-spring 53, which is the mate of 52, wire 2 leads to motor 16 and thence by wire 3, contact-springs 69 and 68, bridge 66, and wire 4 back to battery. It therefore will be understood that when bridge 63 is moved into contact with springs 52 and 53 (bridge 62 being at the same time moved by stop 64 into contact with springs 50 and 51) safety-magnet or electric unit 60 will be energized, and motor 16 will also be energized to move rod 15 upward, and therefore the semaphore-blade 13, to "safety." At the same time bridge 67 will be moved from between contact-springs 70 and 71 and bridge 66 from between contact-springs 68 and 69. At this time roller 47 has been moved to the right-hand end of the horizontal portion 46 of the slot 45 46. In turning the semaphore-blade 13 to danger position the operator moves bar 12 until the roller 47 meets the other end of the horizontal portion of the slot 45 46, and by doing so releases the semaphore-blade 13 and allows its counterweight 14 to carry same to "danger" and make connection by bridge 67 between contact-springs 70 and 71 and by bridge 66 between contact-springs 68 and 69. At the same time bridge 63 is removed from between contact-springs 52 and 53, thus deenergizing safety-magnet or electric unit 60, and by said bridge 63 connection is made between contact-springs 54 and 55. In this position of the parts the solenoid or magnet 49 is energized from the battery or source of electric energy 72 by wire 5, contact-spring 55, bridge 63, contact-spring 54, wire 6, contact-spring 50, bridge 62, contact-spring 51, wire 7, solenoid 49, wire 8, contact-spring 70, bridge 67, contact-spring 71, wire 9, and wire 4 back to the battery. Thereby the armature of the magnet or solenoid 49 is attracted and the rod 48 raised, carrying with it roller 47, which, coöperating with the inclined part 45 of the slot 45 46, moves the bar 12 back to its normal position, as shown in Fig. 1, and breaking the connection between contact-springs 50 and 51 as the stop 65 moves the bridge 62 out of position between said contact-springs. The action of the electric unit 49 is of course an indication to the operator that the semaphore-blade has been returned to "danger."

Referring now to Fig. 2, I have shown my invention applied to electropneumatically-operated switch-points and the rod 61^a of the electric switch in the operator's tower connected with a locking-quadrant 12^a instead of stroke-completing bar 12. Reference may be had to my above-mentioned Patent No. 724,180 and my above-mentioned application Serial No. 231,514, the valves X and Y being controlled in this case by electric relays or magnets X′ and Y′ instead of by pneumatic diaphragms. Motion-plate A is operated by piston 5^a of pneumatic motor W in the usual way. Pipe 7^a supplies power from valve X to operate piston 5^a in one direction, and pipe 6^a from valve Y to operate said piston in the other direction. Said valves X and Y are counterparts of each other, each having three ports. Ports 8^a lead to the supply of compressed air or other fluid under pressure. Ports 10^a lead to the atmosphere or exhaust. Ports 9^a lead to opposite sides of piston 5^a of motor W. The valves X and Y are provided with pistons 11^a, adapted normally to close supply-ports 8^a and open exhaust-ports 10^a. Coöperating with said pistons 11^a are relays X′ and Y′, so that when said relays are energized pistons 11^a will close exhaust-ports 10^a and open supply-ports 8^a. Upon movement of the operator's quadrant 12^a bridge 19 will be brought into contact with contact-springs 20 and 21, and valve X will be opened to admit compressed air by pipe 7^a to motor W, as follows: wire 1^a, safety-magnet 60^a, wire 18^a, contact-springs 21 and 20, bridge 19, wire 2^a, contact-springs 22 and 23, bridge 24, wire 25, relay X′, wire 26 to battery, so that the armature of relay X′ will be raised, and by energy supplied through valve X and pipe 7^a piston 5^a will be moved and will carry with it motion-plate A and switch or controller M, thereby breaking connection between contact-springs 22 and 23 and making connection between contact-springs 27 and 28 by bridge 29 and breaking contact between springs 30 and 31 by bridge 32 and making contact between springs 33 and 34 by bridge 32. In this position roller 47^a will abut against shoulder 35 of the slot in quadrant 12^a, and said roller 47^a will be raised by the action of indicating-solenoid 49^a, which is energized as follows: wires 1^a and 36, solenoid 49^a, wire 37, contact-springs 38 and 39, bridge 40, wire 41, contact-springs 33 and 34, bridge 32, wire 98 to battery. It will be understood that stops 64^a and 65^a operate to move bridge 40 during a portion only of the stroke of rod 61^a, which rod is mechanically connected with quadrant 12^a and moves with it, carrying bridge 19. Said safety-magnet 60^a is also connected in series with the circuit of relays X′ and Y′ by wires 44^a and 45^a, which said wires are connected with windings of said safety-magnet 60^a of greater resistance than the windings of said magnet connected with wires 1^a and 18^a, the two windings of said magnet 60^a being in parallel with each other and in series with either of the relays X′ or Y′, so that should fuse P be blown out by an abnormally large current through wires 1^a and 18^a the magnet 60^a would still operate to attract its armature and raise the rod 92^a by the action of the windings connected with the wire 44^a and 45^a. Said rod 92^a coöperates with notch 93^a on rod 61^a, so as to lock the same, even though the indicating-solenoid 49^a has released the quadrant 12^a. In

other words, while energy is supplied to either relay X′ or Y′ the operator's quadrant 12^a is mechanically locked.

Referring now to Fig. 3, I have shown my invention applied to a crossover or a pair of switch-points and the mechanical lock applied directly to the operative means of the indicator. Referring to said Fig. 3, A^b A^b are the main rails and B^b B^b the siding, C^b C^b the switch-points operatively connected with the main rails A^b A^b, and D^b D^b the switch-points operatively connected with the siding-rails B^b B^b. c^b is a motion-plate for operating the switch-points C^b C^b in the usual manner, and d^b a motion-plate for operating switch-points D^b D^b. Upon movement of the operator's bar or lever 12^b until roller 47^b meets the right-hand abutment of horizontal portion 32^b of slot 33^b 32^b 34^b, bridge 35^b will be moved into contact between contact-springs 36^b and 37^b, and motion-plate c^b will be moved to operate switch-points C^b C^b, as follows: wire 1^b, magnet 60^b, wire 2^b, contact-springs 36^b and 37^b, bridge 35^b, wire 3^b, contact-springs 39^b and 40^b, bridge 41^b, wire 4^b, field 5^b of motor X^b and therethrough by wire 6 to battery. Motor X^b being thereby energized, switch or controller M^b will be moved in correspondence with motion-plate c^b, so as to break connection upon the final movement of the motor between contact-springs 39^b and 40^b, connection having been made between contact-springs 42^b and 43^b by bridge 44^b and connection broken between contact-springs 45^b and 46^b by bridge 107 and connection made between contact-springs 108 and 49^b by bridge 50^b. At the same time contact will be made by bridge 107 between contact-springs 51^b and 52^b and contact will have been broken between contact-springs 53^b and 54^b. The switch-points C^b C^b and motion-plate c^b having been moved to their fullest extent, motor X^b has been cut out of circuit by bridge 41^b moving from between contact-springs 40^b and 39^b, and the energy from the battery or other source of electric energy 72 now energizes motor Y^b, as follows: wire 1^b, magnet 60^b, wire 2^b, contact-springs 36^b and 37^b, bridge 35^b, wire 3^b, contact-springs 51^b 52^b and bridge 107, wire 7^b, contact-springs 55^b and 56^b, bridge 57^b, wire 8^b, field 5^b of motor Y^b, and thus by wire 6^a to battery, so that motor Y^b will be energized to move motion-plate d^b with its switch-points D^b D^b and with the switch or controller N^b, so as to break connection between contact-springs 55^b and 56^b and make connection between contact-springs 58^b and 59^b by bridge 60^b and at the same time break connection between contact-springs 61^b and 62^b by bridge 63^b and make connection between contact-springs 64^b and 66^b by said bridge 63^b. Energy from the source 72 will now energize solenoid or electric unit 49^b, as follows: wires 1^b and 9^b, solenoid 49^v, wire 102, contact-springs 68^b and 69^b and bridge 70^b, wire 13^b, contact-springs 66^b and 64^b, bridge 63^b, wire 14^b, contact-springs 108 and 49^b, bridge 50^b, and wire 6 to battery. Solenoid 49^b being thus energized its armature will operate roller 47^b in inclined portion 34^b of slot 33^b 32^b 34^b, and thereby break connection between contact-springs 68^b and 69^b by bridge 70^b and make connection by bridge 70^b between contact-springs 71^b and 72^b. It will of course be understood that stops 73^b and 74^b operate to move said bridge 70^b during a portion only of the stroke of rod 61^b in the same manner as bridges 62 and 40 of Figs. 1 and 2, respectively, are moved by their respective stops. Said safety-magnet 60^b is connected in series with the circuits of the fields of the motors X^b and Y^b in the same manner as the safety-magnet 60^a of Fig. 2 is connected with the relays X′ and Y′, therein shown; but in this case, Fig. 3, the safety-magnet 60^b is adapted to act directly upon the moving part 92 of the solenoid 49^b instead of upon the operator's bar or quadrant. To this end a notch 93^b is made in the bar 92, with which the bar 48^b coöperates to lock the action of the solenoid 49^b. 50^b is a spring to hold the armature of safety-magnet 60^b in normal position.

It will be understood that the main feature of my invention is a mechanical means for locking the apparatus against the action of the indicator in cases where a stroke-completing bar is used, or against the operator when a locking-quadrant is used. Of course it will be understood that in the case of a stroke-completing bar "indication" is the final movement of the bar, and in the case of a quadrant "indication" is the unlocking of the same.

Of course I do not limit myself to either a series or a parallel electrical connection, nor to a return to battery by metallic circuit as distinguished from grounding.

What I claim, and desire to secure by Letters Patent, is—

1. In apparatus for operating switches, signals and the like, comprising an electric indicator and an electrically-operated motion plate or device to be moved, means for preventing the action of the indicator while there is electric energy supplied to the operative means of said motion-plate, which consists of a mechanical lock for said indicator, operated by electric means separate from said indicator.

2. In electric apparatus for operating switches, signals and the like, comprising an electric indicator and an electrically-operated motion plate or device to be moved, means for preventing the action of the indicator while there is electric energy supplied to the operative means of said motion-plate, which consists of a mechanical lock for said

indicator, operated by electric means separate from said indicator.

3. In apparatus for operating switches, signals and the like, comprising an electric indicator and a plurality of electrically-operated motion plates or devices to be moved, means for preventing the action of the indicator while there is electric energy supplied to the operative means of any of said motion-plates, which consists of a mechanical lock for said indicator, operated by electric means separate from said indicator.

4. In electric apparatus for operating switches, signals and the like, comprising an electric indicator and an electrically-controlled motion plate or device to be moved, means for locking the apparatus against the indicator or operator while there is energy supplied to the controlling means of the motion-plate, which consists of a mechanical lock for said apparatus operated by electric means separate from said indicator.

In testimony whereof I have hereunto set my hand this 18th day of September, 1904.

LAWRENCE GRIFFITH.

In presence of—

FRANCIS C. FIELD,

H. V. N. PHILIP.