

A. HADDOCK & A. SCHMITT.
SAFETY SWITCH LOCK.

APPLICATION FILED NOV. 13, 1908.

Patented Oct. 5, 1909.

2 SHEETS—SHEET 1.

935,972.

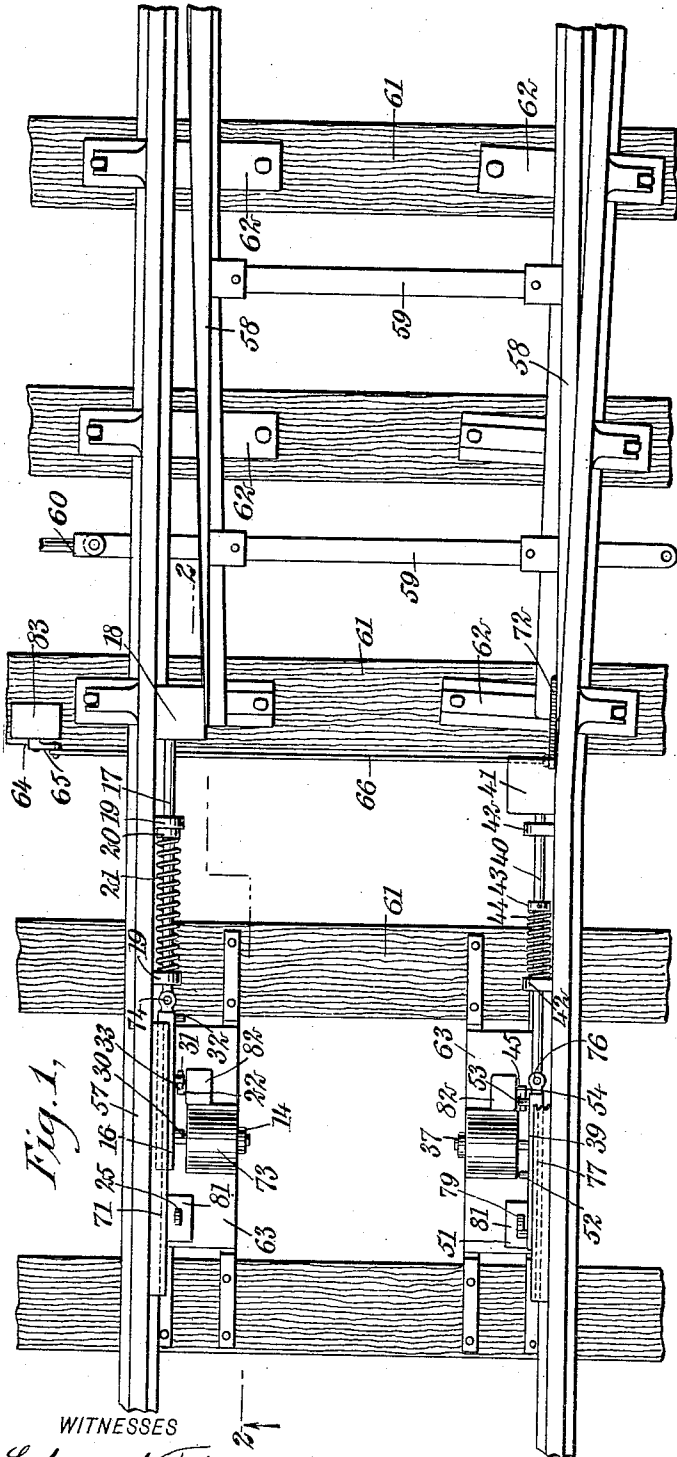


Fig. 1.

WITNESSES

Edward Thorpe
John K. Brachvogel

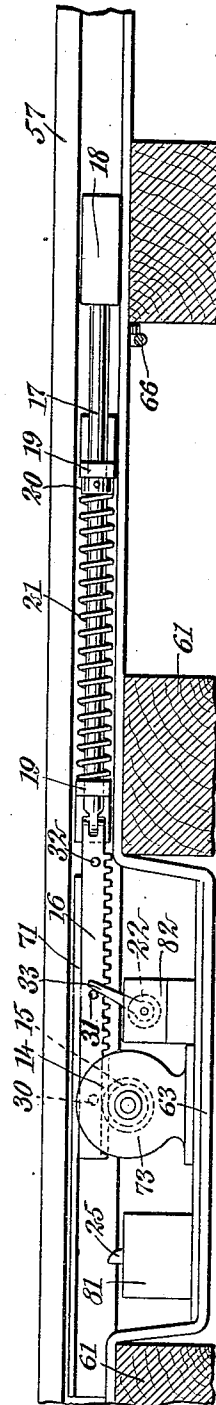


Fig. 2.

INVENTORS

Arthur Haddock
Albert Schmitt

BY

Mum Co.

ATTORNEYS

A. HADDOCK & A. SCHMITT.

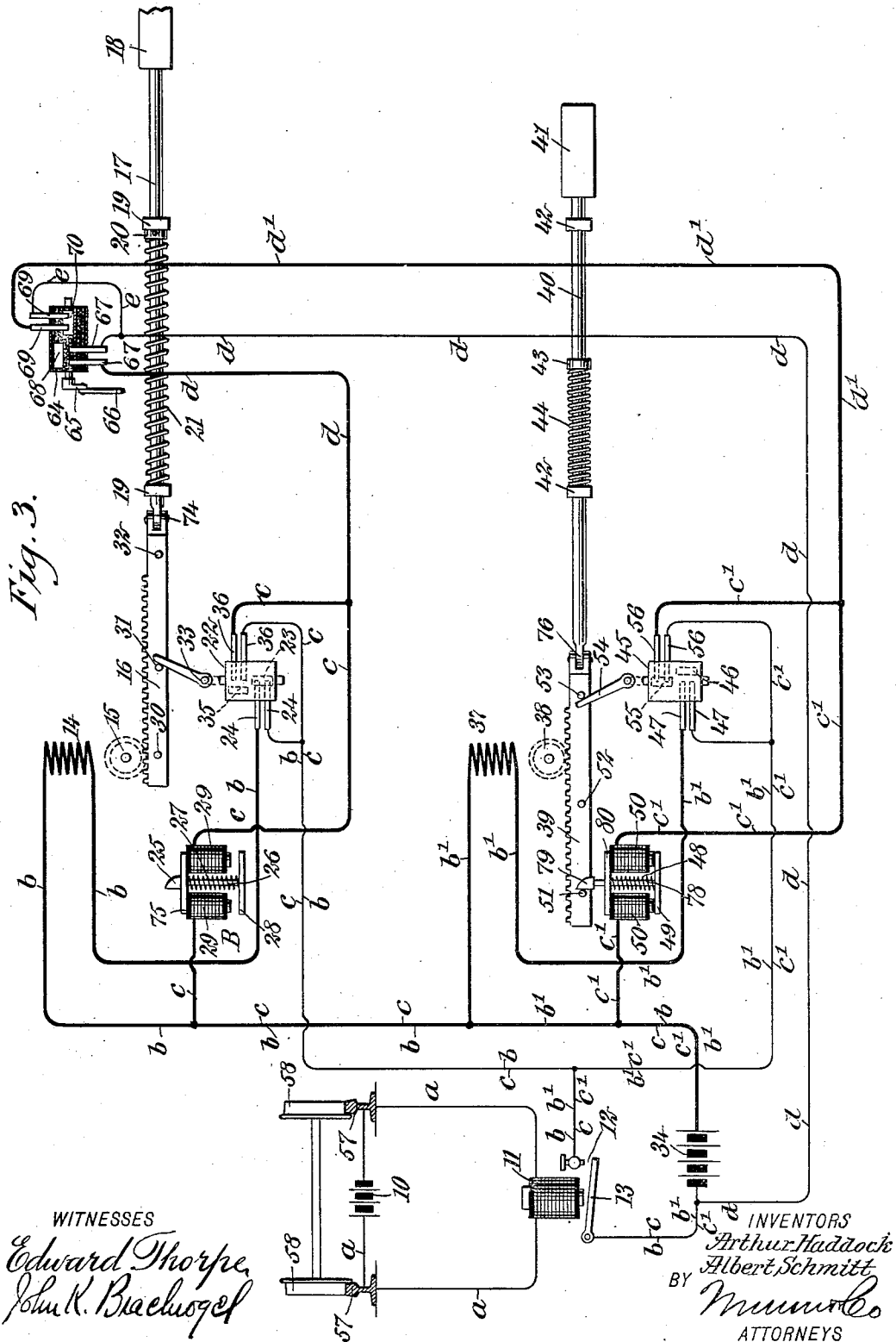
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UNITED STATES PATENT OFFICE.

ARTHUR HADDOCK AND ALBERT SCHMITT, OF NEW YORK, N. Y.

SAFETY SWITCH-LOCK.

935,972.

Specification of Letters Patent.

Patented Oct. 5, 1909.

Application filed November 13, 1908. Serial No. 462,420.

To all whom it may concern:

Be it known that we, ARTHUR HADDOCK and ALBERT SCHMITT, citizens of the United States, and both residents of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Safety Switch-Lock, of which the following is a full, clear, and exact description.

10 This invention relates to safety switch locks and more particularly to a switch lock comprising locking members or blocks each adapted to be inserted between a track rail and a switch point to hold the same in relatively fixed positions, suitable means tending normally to position the blocks operatively, motors controlling the blocks, and each in circuit with a suitable source of electrical supply, a track relay controlling the motor circuits so that when a train is on the block the relay is short circuited and the motor circuits are opened, means for locking the blocks in inoperative positions, the locking means being controlled by the movements of the blocks which operate commutators controlling the locking circuits, and a further commutator operable by the movement of the switch points and serving to connect the locking means with the source of electric supply independently of the action of the relay.

35 An object of the invention is to provide a simple, inexpensive and efficient safety switch lock which can be used in connection with various switch systems and different block signal systems without interfering with the operation thereof, and which serve to lock a switch either open or closed as set by the switchman, so that the switch cannot be accidentally displaced while a train is approaching the switch or is passing over the same.

45 A further object of the invention is to provide a safety switch lock which is absolutely automatic in operation, which cannot be easily disarranged or rendered inoperative, and by means of which the switch points are so positively locked in position relative to the track rails that accidental displacement of the switch points is impossible without destroying the same.

50 A still further object of the invention is to provide a device of the class described which is electrically operated and controlled, which is rendered operative by a

train approaching the switch and thus operating a track relay, and which is so compact in form and arrangement that it can be positioned close to the switch adjacent to the track rails without interfering with traffic passing along the rails.

The invention consists in the construction and combination of parts to be more fully described hereinafter and particularly set forth in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views, and in which—

Figure 1 is a plan view showing a railroad switch having an embodiment of our invention applied thereto; Fig. 2 is a longitudinal section on the line 2—2 of Fig. 1; and Fig. 3 is a plan view showing the parts of our invention and indicating in dotted outline the electric circuits controlling the same.

Before proceeding to a more detailed explanation of our invention, it should be clearly understood that while the same is particularly useful in connection with railroad systems, it can also be advantageously employed in connection with other track systems, for example, in street car service, in overhead trolleys, and the like. We provide locking members adapted to be inserted between the track rails and the switch points to hold these parts relatively fixed and secure against accidental relative movement. The locking members are independently operable, and when one is operatively positioned the other is inoperatively positioned so that the switch can lock open or shut as the case may be. It should be emphasized that it is often of the greatest importance to insure that a switch is locked in the position set by the switchman or other operator controlling the switch, so that it cannot be accidentally shifted while a train is approaching the same or passing over it, as it is needless to say such a contingency presents dangerous possibilities. We prefer to employ electrical means for operating the switch locking members, as the action of the parts is rapid and certain. Any suitable source of electric supply can be used in connection with the device, for example, a series of batteries; but, if so desired, current can be drawn from a regular supply line.

The track relay which we use in connection with our invention may consist of a regular signal block circuit or the like, providing it includes a suitable electro-magnet controlling an armature switch which serves to open and close the motor circuits of the device and providing further that the relay is short circuited or otherwise operated by a train approaching along the track adjacent to the switch.

Referring more particularly to the drawings, Fig. 3, we provide a track relay circuit *a a* which includes a suitable source of electric supply 10 consisting for example of a battery, or series of batteries, and an electro-magnet coil 11 which controls an armature switch 13 having a movable contact 12. The track rails 57 are included in the relay circuit and the latter is thus short circuited when railroad car wheels travel along the track within the confines of the circuit. When the track relay is short circuited the magnet 11 is deenergized and the armature 13 gravitationally opens the switch 12.

The first motor circuit *b b* includes an electric motor 14 which may be of any suitable type adapted for the purpose and is preferably arranged within a protective casing or cover 73. The motor has a gear wheel 15 in mesh with the teeth of a rack bar 16 slidably arranged adjacent to one of the track rails 57 and movably held in place by a guide 71 secured to the rail. A rod 17 has a suitable connection 74 with the rack bar and is arranged to move in guides 19 mounted upon the rail 57. At the end remote from the rack bar the rod 17 has a locking member or block 18 adapted to be inserted between the rail 57 and the adjacent switch point 58. A collar 20 is rigidly secured upon the rod, which likewise has resiliently mounted thereon a helical spring 21 engaging the collar 20 and one of the guides 19 so that it tends normally to project the block 18 into an operative position, between the rail and the switch point. The circuit *b b* has a commutator 22 fashioned from any suitable insulating material and provided with a contact 23 adapted electrically to connect terminals 24 of the circuit, so that the same can be closed or broken by means of the commutator. The circuit furthermore, includes a source of electrical supply 34 consisting of a battery or the like. Another circuit *c c* comprises partly, as is indicated in Fig. 3, certain of the conductors which form the circuit *b b* and also includes electro-magnet coils 29 which control an armature 28. The latter is rigidly connected with a catch stem 26 having at one end a catch 25. A helical spring 27 arranged upon the stem and engaging the armature and a suitable abutment 75, tends normally to hold the catch depressed and the armature displaced from engagement with the

coils. The rack bar 16 has a stud 30 adapted to engage the catch 25 whereby the rack bar is locked in position such that the block 18 is inoperative. The rack bar has further spaced studs 31 and 32 each adapted to engage a pivoted finger 33 which controls the commutator 22 and is adapted to rotate the same in one direction or the other accordingly as it is swung in one direction or the other by the movement of the rack bar. The circuit *c c* also includes the source of supply 34 and has terminals 36 adapted to be electrically connected by a contact 35 of the commutator 22, so that the latter also serves to make or break the circuit *c c*.

We provide a second motor circuit *b' b'* which includes a motor 37 having a driving gear 38 in mesh with the teeth of a rack bar 39. The latter controls a rod 40 secured to the rack bar by means of a suitable connection 76, and having at the end a locking member or block 41 adapted to be inserted between the other track rail and the other switch point 58. The rack bar 39 is arranged adjacent to the other track rail and is movably positioned by means of a suitable guide 77. The rod 40 has a rigid collar 43 and slides in guides 42 mounted upon the other track rail, and furthermore has arranged thereon a helical spring 44 engaging the collar 43 and one of the guides 42, normally to project the block 41 into an operative position. A second commutator 45 has a contact 46 adapted electrically to connect terminals 47 of the circuit *b' b'*. The latter, it will be understood, is also controlled by the track relay and likewise, also includes the source of supply 34. A further circuit *c' c'* like the circuit *c c*, is controlled by the track relay and draws current from the source of supply 34. It includes electro-magnet coils 50 which control an armature 49 having a rigid stem 78 carrying a catch 79. A spring 48 on the stem engages the armature and a fixed abutment 80 and serves normally to displace the armature from engagement with the coil to hold the catch 22. The circuit *c' c'* also includes terminals 56 adapted to be electrically connected by a contact 55 mounted upon the commutator 45. A pivoted finger 54 adapted to be displaced by studs 52 and 53 of the rack bar 39 controls the armature. The rack bar also has a stud 51 arranged to abut against the catch 79 when the armature coils 50 are energized, to lock the rack bar in position such that the block 41 is inoperative.

It will be understood that the switch may be of any suitable type which includes movable switch points 58 and that the track rails and the switch points are carried upon the rail ties 61, the points being operatively connected by cross bars 59 and being slidably supported upon chairs 62. A switch rod 60 leading to a switch tower or other suitable

operating point controls the switch. The parts of the switch lock can be suitably mounted adjacent to the switch points upon carriers 63 having downwardly offset parts and positioned between adjacent ties to which they are secured by spikes or in any other convenient manner. We also employ a switch-point-controlled commutator 64 having an arm 65 which is operatively connected with the switch points by means of a link 66, so that the commutator is rotated in one direction or the other as the switch is opened or closed by correspondingly shifting the switch points. Conductors d , d have terminals 67 adapted to be electrically connected by a suitable contact 68 of the commutator 64. The conductors d , d are respectively connected with the circuit $c c$ between the commutator 22 and the coils 29 and with the source of supply 34 forming with their connections a circuit, controlled by the commutator 22. A conductor d' has a terminal 69 adapted to engage a contact 70 of the commutator 64 and is connected with the circuit $c' c'$ between the commutator 45 and the coils 50. A further conductor $e e$ connects one of the conductors d with a second terminal 69 adapted to engage the contact 70 and forms, with the conductors d , d and $d' d'$, a circuit adapted to be controlled by the commutators. In the position of the parts shown in diagrammatic outline, the block 41 is inoperative and the block 18 is operative to hold the switch closed. That is, to permit a train to pass along the main track without deviating on to the switch. When the switch points are thrown into this position by the switch operator, the blocks are of course retracted to permit the movement of the switch points. When a train passes on to the track relay and short circuits the same, the movable contact 13 falls and opens the circuit $c c$, thereby deenergizing the coils 29 and permitting the spring 27 to retract the catch 25 to release the rack bar. The spring 21 then at once projects the block 18 into a locking or operative position between the track rail and the switch point. The forward movement of the rack bar forces the stud 31 into engagement with the finger 33 and operates the commutator so that the terminals 36 are out of engagement with the contact 35 and so that the contact 23 electrically connects the terminals 24. However, as both the circuits $c c$ and $b b$ are open, owing to the short circuiting of the relay, neither the motor circuit nor the catch circuit have current flowing therein. The block 41 is retracted, the rack bar 39 being locked in an inoperative position by the catch 79, as the coils 50 are energized by current flowing from the source 34. This is possible owing to the fact that the coils 50 are energized by current flowing from the source 34 through the conductor $d d$,

the conductor $e e$, the terminal 69 and the contact 70, and the conductor $d' d'$, and part of the circuit $c' c'$ to the source 34. It will be understood that the parts are so arranged that the throwing of the switch into the position described operates the commutator 64 electrically to connect the terminal 69.

After the train leaves the relay circuit the coil 11 is again energized and the circuit $b b$ is closed by the switch 12. Current then flows through the motor 14 and the latter is driven to retract the rack bar 16 against the tension of the spring 21, returning the block 18 to the inoperative position. At the same time the rack bar, through the engagement of the stud 32 with the finger 33 rotates the commutator 22 and connects the terminals 36, so that the circuit $c c$ is closed and current flows through the coils 29, energizing them to project the catch 25, whereby it can be engaged by the stud 30 which thus serves to hold the rack bar locked in an inoperative position. At the same time the movement of the commutators 22 has broken the motor circuit $b b$ and the motor stops. Now both the blocks 18 and 41 are in inoperative positions and the switch points can be thrown from one side to the other. If the switch is allowed to remain in the first position, the next train which passes over the switch short circuits the relay and the block is again automatically projected to lock the switch against accidental displacement. If however, it is desired to throw the switch after the train has passed, the switchman operates the rod 60, and the switch points are moved into a position opposite to that previously described. This movement of the switch points rotates the commutator 64 to effect communication between the terminals 67 and 69. When a train enters the relay circuit with the switch points in this position, the circuit $c' c'$ is broken and the coils 50 are deenergized to retract the catch 79 so that the spring 44 projects the block 41 into the operative position. The coils 29 are not deenergized as they continue to draw current from the source of supply 34 through the conductors $d d$, of which the terminals 67 are electrically connected by the contact 68 in this position of the commutator 64, and through the circuit $c c$. Consequently the block 18 is held inoperative. As soon as a train leaves the relay circuit, the switch 12 closes and current flows to the motor 37 through the circuit $b' b'$, the terminals 47 being operatively connected by the contact 46. The motor retracts the rack bar 39, and the engagement of the stud 53 with the finger 54 shifts the commutator 45 so that the motor circuit is broken and the coils 50 receive current through the circuit $c' c'$ to project the catch 79 to hold the rack bar 39 inoperative, the terminals 56 being electrically

connected by the contact 55 in this position of the commutator. Like the motors, the catches and their coils, the commutators controlling the motor circuits and the switch-point controlled commutator, are provided with protective casings 81, 82 and 83 respectively.

The relay circuit *a a* extends in both directions from the switch, so that it is controlled by trains approaching the switch from both directions.

Having thus described our invention, we claim as new and desire to secure by Letters Patent:

1. In combination, locking members adapted to be inserted between track rails and switch points to hold the same relatively fixed, means for locking said members in inoperative positions, means for retracting said members from operative position, a track relay controlling said last-mentioned means, and means for controlling said retracting means independently of said track relay.

2. In combination, locking members adapted to be inserted independently between track rails and switch points to hold the same relatively fixed, motors controlling said members to retract the same and having circuits, a common source of supply for said motor circuits, a track relay controlling said motor circuits, means for holding said members independently in inoperative position, and means independent of said track relay for independently rendering said holding means operative.

3. In combination, locking members adapted to be inserted independently between track rails and switch points, springs tending to position said members operatively, motors for retracting said members against the tension of said springs, said motors having circuits, a common source of supply for said circuits, catches for holding said members inoperative, said catches having circuits electrically controlling the same, said catch circuits receiving current from said source of supply, a track relay controlling all of said circuits, and a commutator and conductors for rendering said catch circuits independent of said relay.

4. In combination, a locking member adapted to hold a switch point locked with respect to a track rail, means tending normally to render said member operative, a motor controlling said member, a track relay controlling said motor, and means for locking said member inoperative, said last mentioned means being controlled by the movement of said member itself.

5. In combination, a locking member adapted to hold a switch point locked with respect to a track rail, a spring for normally projecting said member into an oper-

ative position, a motor controlling said member to retract the same and having a circuit, a track relay controlling said circuit, and a catch for locking said member retracted, said catch having an electro-magnet adapted to render the same operative when said magnet is energized, and being controlled by the movement of said member into an inoperative position.

6. In combination, locking members adapted to be inserted independently between track rails and switch points to hold the same relatively fixed, motors controlling said members, a source of supply for said motors, a track relay controlling said motors, and springs tending normally to render said members operative.

7. In combination, locking members adapted independently to engage switch points to hold the same locked, motors controlling said members, a source of electrical supply for said motors, a track relay controlling said motors, springs tending normally to render said members operative, and catches controlled by the movement of said members themselves and serving to lock the same in inoperative positions, one of said catches being operative while the other is inoperative.

8. In combination, a locking member adapted to engage a switch point to hold the same fixed, a motor for retracting said member, a spring tending normally to project said member into an operative position, an electro-magnetically controlled catch for locking said member in an inoperative position, a motor circuit, a catch circuit, a source of electric supply for said circuits, a track relay controlling said circuits, and a commutator controlled by said member and serving to make and break said circuits.

9. In combination, a locking member adapted to engage a switch point to hold the same fixed, a motor for retracting said member, a spring tending normally to project said member into an operative position, an electro-magnetically controlled catch for locking said member in an inoperative position, a motor circuit, a catch circuit, a common source of electric supply for said circuits, a track relay controlling said circuits, a commutator controlled by said member and serving to make and break said circuits, and a further circuit for connecting said catch with said source of supply independently of said relay and said commutator.

10. In combination, a locking member adapted to engage a switch point to hold the same fixed, a spring tending normally to project said member operatively, a motor for retracting said member, an electro-magnetically controlled catch adapted to lock said member in an inoperative position, a motor circuit, a catch circuit, a source of

supply for each of said circuits, a track relay controlling said circuits, whereby said circuits are broken when a train short circuits said relay, said catch being inoperative when its circuit is broken, and a commutator controlling said circuits and adapted to be operated by the movement of said member, whereby said motor circuit is broken when said member has been retracted into an inoperative position, and whereby said catch is operative when said member has been retracted.

11. In combination, a locking member adapted to engage a switch point to hold the same fixed, a spring tending normally to project said member operatively, a motor for retracting said member, an electro-magnetically controlled catch adapted to lock said member in an inoperative position, a motor circuit, a catch circuit, a common source of supply for said circuits, a track relay controlling said circuits, whereby said circuits are broken when a train short circuits said relay, said catch being inoperative when its circuit is broken, a commutator controlling said circuits and adapted to be operated by the movement of said member, whereby said motor circuit is broken when said member has been retracted into an inoperative position, and whereby said catch is operative when said member has been retracted, a further circuit for connecting said source of supply and said catch independently of said relay, and a commutator controlling said further circuit, said last commutator being operated by the movement of the switch points.

12. In combination, locking members adapted to engage switch points independently to hold the switch open or closed, springs tending normally to project said members into operative positions, motors controlling said members and having circuits, catches adapted to hold said members locked in inoperative positions, and being electro-magnetically controlled, said catches having circuits, a source of supply for said circuits, a track relay controlling said circuits, whereby said circuits are broken when said relay is short circuited by a train, commutators controlling said circuits and each controlled by one of said members, further circuits connecting said catches with said source of supply independently of said relay, and a commutator controlling said further circuits and controlled by the switch points.

13. In combination, a locking member adapted to engage a switch point to hold the same fixed, a spring tending normally to project this member into an operative position, a motor for retracting said member, a catch adapted to lock said member in an inoperative position and having an electro-

magnet controlling it, a motor circuit, a catch circuit, a source of supply for said circuits, a commutator having contacts, said circuits having terminals, said terminals of each of said circuits being adapted to be connected by one of said contacts, means for controlling said commutator by said member, a further commutator having a contact and a circuit including said source of supply, and having terminals adapted to be connected by said contact of said further commutator.

14. In combination, a locking member adapted to engage a switch point to hold the same in position, a spring tending normally to project said member to an operative position, a motor for retracting said member into an inoperative position, a catch adapted to engage said member to hold the same in an inoperative position, a spring tending normally to hold said catch inoperative, an electro magnet serving when energized to render said catch operative, a motor circuit, a magnet circuit, a source of supply for said circuits, a track relay controlling said circuits, a commutator having contacts, each of said circuits having terminals adapted to be connected by one of said contacts, whereby one of said circuits is broken when the other of said circuits is closed, means for operating said commutator by the movement of said member, a further commutator, conductors electrically connected with said source of supply and having terminals, said further commutator having a contact adapted electrically to connect said terminals of said conductors, and means for operating said further commutator by the movement of the switch point.

15. In combination, locking members adapted independently to engage switch points to hold the same fixed, whereby the switch can be locked open or shut, springs tending normally to position said members operatively, motors each serving to retract one of said members into an inoperative position, catches each adapted to engage one of said members to lock the same in an inoperative position, springs tending to render said catches inoperative, electro magnets serving when energized, to render said catches operative, motor circuits, catch circuits, a source of supply for said circuits, a track relay controlling said circuits, commutators each operable by one of said members, and each having contacts, each of said circuits having terminals adapted to be electrically connected by one of said contacts, whereby each of said motor circuits is opened when each of said catch circuits is made, pivoted fingers each controlling one of said commutators and each operable by one of said members, and a further commutator operable by the switch points and having contacts and

conductors electrically connected with said source of supply and each having terminals adapted to be electrically connected by one of said contacts of said further commutator, whereby each of said electro magnets can be supplied with current from said source of supply independently of said track relay.

In testimony whereof we have signed our

names to this specification in the presence of two subscribing witnesses.

ARTHUR HADDOCK.
ALBERT SCHMITT.

Witnesses:

JOHN K. BRACHVOGEL,
JOHN P. DAVIS.