No. 832,192. PATENTED OCT. 2, 1906.

W. K. HOWE.

RAILWAY SWITCHING AND SIGNALING APPARATUS.

APPLICATION FILED AUG. 29, 1905.

2 SHEETS—SHEET 1.

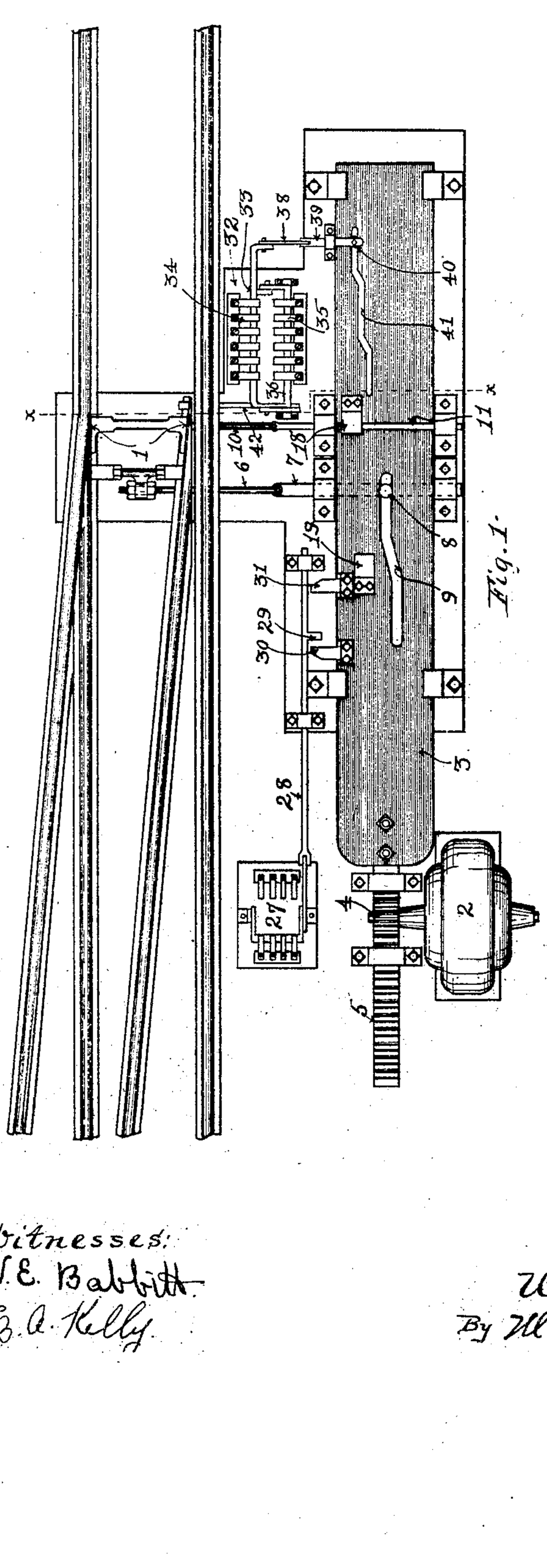

Fig. 1.

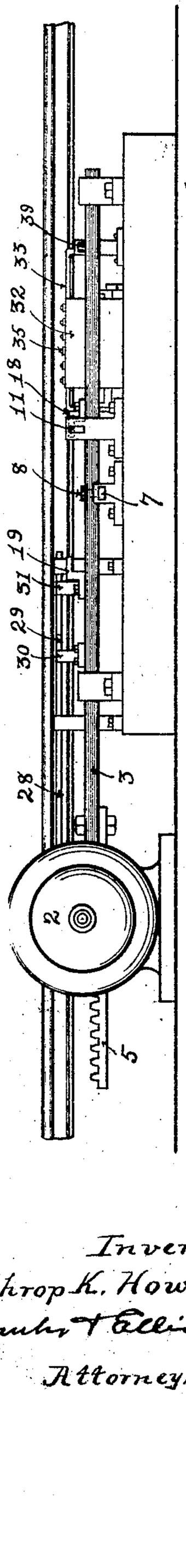

Fig. 2.

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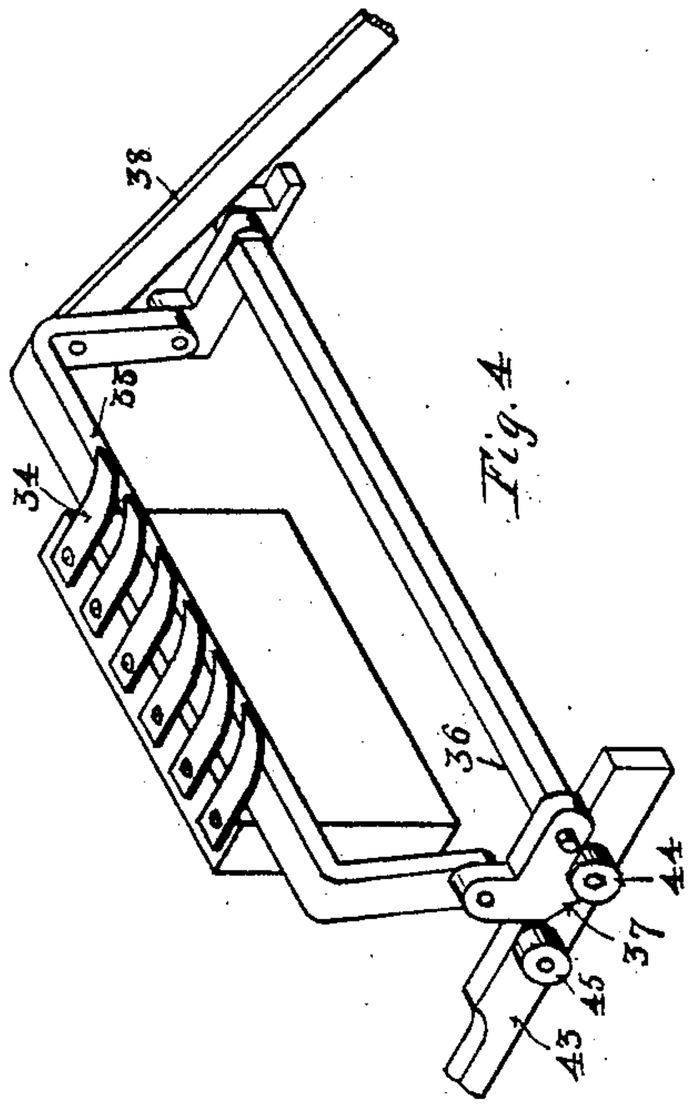

Fig. 4

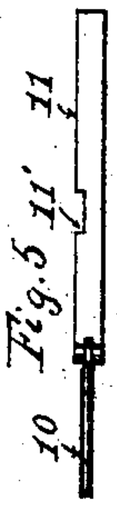

Fig. 5

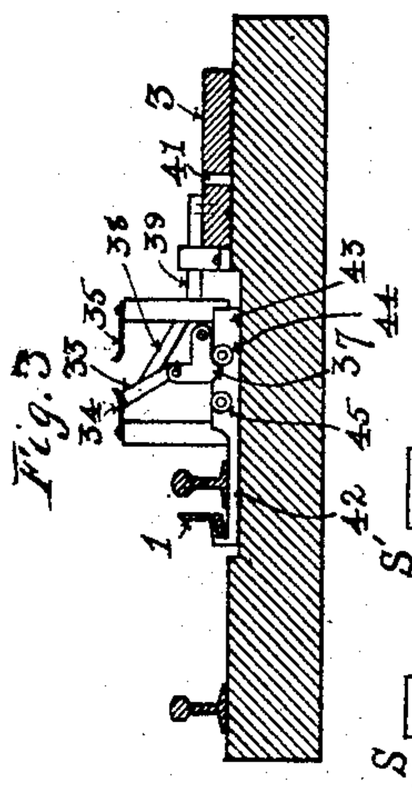

Fig. 3

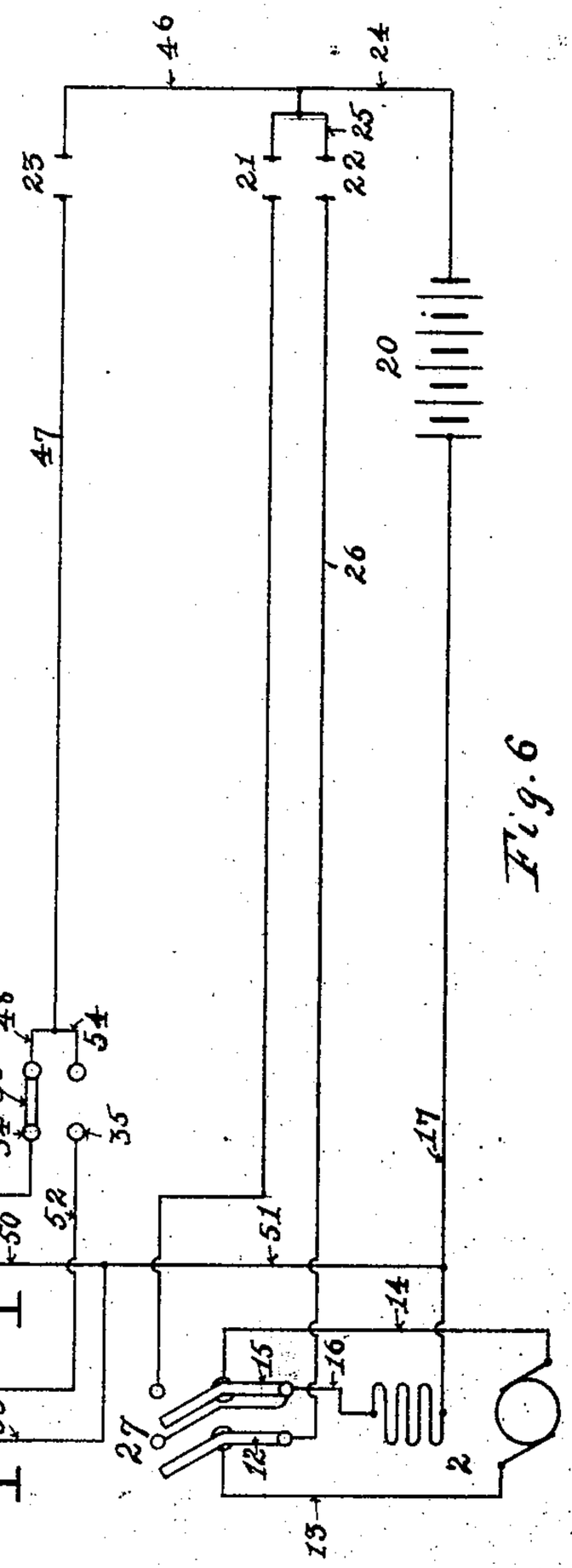

Fig. 6

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UNITED STATES PATENT OFFICE.

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RAILWAY SWITCHING AND SIGNALING APPARATUS.

No. 832,192. Specification of Letters Patent. Patented Oct. 2, 1906.

Application filed August 29, 1905. Serial No. 276,290.

To all whom it may concern:

Be it known that I, WINTHROP K. HOWE, 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 and Signaling Apparatus, of which the following is a specification.

My invention relates to railway switching and signaling apparatus, and more particularly relates to that class of railway switching and signaling apparatus employing electricity for the motive power, although it may be used with equal facility with other forms of energy for the motive power.

The chief object of my invention is to provide means whereby the signal circuit or circuits are not completed until after the switch-points are moved to their proper position and locked and means for breaking said signal circuit or circuits if the switch-points are either moved from their proper position or unlocked. Thus if a switch is trailed by a train a signal cannot be given back over that switch until the trouble is remedied, and, further, if the slot in the lock-rod through which the lock-bolt enters should become elongated, so that the lock-bolt could enter or pass through the lock-rod without the switch-point being in its proper position, the signal-circuits governing such switch would not be closed.

To this end my invention consists of the apparatus shown in the accompanying drawings, diagrammatic in character, in which like characters of reference indicate similar parts throughout the several views.

Figure 1 is a plan of a rail-switch equipped with my invention. Fig. 2 is a side elevation of the switch mechanism. Fig. 3 is a section on the line *x x* of Fig. 1. Fig. 4 is an isometric view of my switch-box, parts being omitted to properly show the construction. Fig. 5 is a detail side elevation of my locking-plate. Fig. 6 is a diagram of circuits.

The rail-switch points 1 are connected and moved to establish the route in the usual manner by a motor 2, which reciprocates a motion-plate by engagement of a spur gear 4 or the motor 2 with a rack 5, rigidly secured to the motion-plate 3.

6 is the switch-rod for moving the switch-points 1 1. Pivoted to this rod 6 is a flat plate 7, which carries pivoted to it a roller 8. This roller 8 lies in a slot 9 in the motion-plate 3. By the reciprocation of the motion-plate 3 through the roller 8 in the slot 9, the bar 7, and the switch-rod 6 the switch-points 1 1 are moved from one position to the other.

10 is a lock-rod connected to the switch-points and connected to the locking-plate 11. This plate 11 passes through guides and moves with the switch-points in the usual manner. The plate 11 has a notch 11′, (see Fig. 5,) in which lock-bolts 18 and 19 are capable of entering for locking the switch. The lock-bolts 18 and 19 are offset on the motion-plate 3, so that one of the bolts will register with the notch 11′ when the switch-points are in one position and so that the other bolt will register with said notch when the switch-points are in the other position.

27 is a pole-changing switch of the usual type, which serves to reverse the current in the armature of the motor 2 to produce the reciprocatory movement of the motion-plate 3. This pole-changing switch is operated by a rod 28, pivoted to it and mounted in any suitable manner by the side of the motion-plate 3. The rod 28 carries a lug 29, which lies in the path of the lugs 30 and 31, which are rigidly secured to the motion-plate 3. It is evident that the lug 31, engaging the lug 29, will move the switch 27 to send the current through the armature of the motor 2 in one direction and that the lug 30, engaging the lug 29, will reverse the current in the armature of the motor, as clearly indicated in the diagram of Fig. 6.

Situated adjacent to the switch-points 1 is a switch-box 32. This may be an apparatus for performing the ordinary function of opening and closing the signal-circuits, or it may be also a selector, as I have shown in the drawings. It will be understood by one skilled in the art that having a switch-box of the construction shown in the drawings it may be operated as a selector in addition to the function of an ordinary switch or merely as an ordinary switch for opening the signal-circuit whenever the switch-points are not fully home.

33 is a contact-bar which is capable of making the necessary electrical connections between the set of contacts 34 in one position and of making the necessary electrical connections between the set of contacts 35 in the other position. This contact-bar 33 has its ends bent at right angles, and those ends are pivoted to the yoke 36, which in turn is pivoted to lugs secured to the base of the box. Upon one end of this yoke 36 is a V-shaped lug

37. Pivoted to one end of the contact-bar 33 is a rod 38, which is connected to a plate 39, which has pivoted to it a roller 40, which lies in a slot 41 in the motion-plate 3. The manner in which this contact-bar is moved will be more fully described hereinafter.

Secured to the switch-points 1 1 is a rod 42, which is connected to or integral with the bar 43, which is mounted in guides. Pivoted to the plate 43 are rollers 44 and 45. These rollers 44 and 45 are so positioned that when the switch-points are home in the positions for the main track the roller 44 will engage the lug 37 and force the yoke 36 upwardly and force the contact-bar 33 into contact with the set of contacts 34, and when the switch-points are home in the position for the side track the roller 45 will engage the lug 37 and force the yoke 36 upwardly and force the contact-bar 33 into contact with the set of contacts 35, (the bar 33 having been moved by the rod 38, as hereinafter more fully described.)

In the diagram of Fig. 6, 20 is a source of electric energy, 21 and 22 are contacts on the switch-circuit controller, and 23 contacts on the signal-circuit controller. S' is a signal to be moved to the proceed position only when the switch-points are set for the main line, and S is a signal to be moved to the proceed position only when the switch-points are set for siding. In the drawings the rail-switch is set for the main track and the signals are both in the stop position. Assume it to be desired to set the rail-switch for the siding. The contacts 22 are bridged and current flows from battery 20 through wires 24 25, bridge of contacts 22, wire 26, arm 26 of pole-changer 27, wire 13, armature of motor 2, wire 14, arm 15 of pole-changer 27, wire 16, field-motor 2, and common wire 17 back to battery. Current being supplied to the motor 2, it will rotate the spur-gear 4 and move the motion-plate 3, (to the right in Fig. 1.) The roller 40 in the slot 41 in the motion-plate 3 by contact with an incline in the slot moves the contact-bar 33 out of electrical connection with the set of contacts 34. The bolt 18 on the motion-plate 3 will during this movement be carried out of the notch 11' in the locking-plate 11, so that the switch-points may be moved to reverse the rail-switch. These movements completed, the conditions are proper for the movement of the rail-switch—that is, the signal-circuit has been broken at the switch-box, and the signal is necessarily at "danger" while the locking-bolt is withdrawn. It will be noted that during the above-described movement the roller 8 has occupied a straight part of the slot 9—that is, a part that is parallel with the line of movement of the motion-plate 3—and consequently no energy has been employed to move the switch. It will be likewise noted that while the roller 8 has occupied a straight part of the slot 9 the functions of unlocking the rail-switch and breaking the signal-circuit have been performed. With the third part of the movement the rail-switch is moved because the middle inclined portion of the slot 9 has come into contact with the roller 8. During this movement the contact-bar 33 has remained at rest and out of electrical connection with either set of contacts because the roller 40 has been engaged by the middle straight portion of the slot 41, while at the same time the bolt 19 on the bar 14 has approached the bar 11, ready for locking at the next movement. The third movement, just described, is completed when the straight portion of the slot 9 engages the roller 8. At that time motion-plate 3 carries the bolt 19, so that it enters the notch in the bar 11 and locks the rail-switch. At the same time the roller 40 is engaged by the second incline in the slot 41, and the contact-bar is moved to make electrical connection with the contacts 33. It will be noted that the switch-points having been fully reversed the rod 42 has moved the plate 43, so that the roller 45, engaged the V-shaped lug 37 on the yoke 36, and thus lifts the contact-bar 33 into electrical connection with the contact-points 35. At the close of this last-mentioned movement the motor is driven with power applied and without load, thus acquiring momentum for indication until the lug 30 on the motion-plate 3 strikes the lug 29 on the rod 28 and breaks the battery-circuit at the pole-changing switch 27 and in a moment establishes the indication-circuit by the completion of the throw of the pole-changing switch. The energy required to produce the indication will bring the motor to rest at the time the roller 8 will have nearly reached the end of the slot 9.

In order that the operation of my switch-box as a signal-selector may be clearly understood, assume the movement above described to have been completed and that it is desired to move the signal S to the proceed position. The box 33 has already been moved to bridge the contacts 35 by the switch movement. The operator then bridges the contacts 23 of the signal-controller and sends current from battery 20 through wires 24 46, bridge of contacts 23, wires 47 54, bar 33, bridging contacts 35, wire 52, operating mechanism of signal S, wires 53 51, and common 17 back to battery, thus moving the signal S to the proceed position. If, on the other hand, the rail-switch were set for the main track, the bar 33 would bridge the contacts 34 and the signal S would go to "stop" and could not be cleared; but on closing the signal-circuit at the controller current would pass through wire 49 to the operating mechanism of signal S' and thence through wires 50 51, and common back to battery, moving S' to the proceed position.

In the diagram I show a selector for only two signals; but, as indicated by the contacts, in the other figures, I may employ my switch-box to select between any desired number of signals.

Since a movement from reverse back to the main track would be substantially a repetition of the steps just described, it need not be further described here. The system of indication employed is the Taylor dynamic system of indication, shown in patents to John D. Taylor, as follows: No. 516,903, March 20, 1894; No. 554,097, February 4, 1896; No. 605,359, June 7, 1898, reissued No. 11,983, May 6, 1902.

It is evident from the description of the movement of the rail-switch that the signal-circuit is not closed until the rod 42 has forced either the roller 44 or 45 against the lug 37 on the yoke 36 and that this can take place only when the points of the rail-switch have been brought to their proper position and locked. Suppose the switch to have been properly moved and that the switch has been trailed. A bent switch-point is the result. This inevitably moves the bar 42, so that the roller in contact with the lug 37 is moved away, the yoke 36 lowers of its own weight, and the contact-bar 33 breaks electrical connection between the contacts 34 and 35, as the case may be, and the signal goes to "danger," if not already in that position, and it cannot be moved to "clear." This feature of my invention is of the greatest importance, since hitherto it has not been possible to prevent in all cases the evils arising from bent or trailed switches.

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

1. The combination with a switch-operating mechanism, switch-points and signaling-circuits of means for locking said switch-points, means for making said signaling-circuits only after said switch-points are moved to their proper positions and locked and means for breaking said signaling-circuits if said switch-points are either moved from their proper positions or unlocked.

2. The combination with a switch-operating mechanism, switch-points and signaling-circuits, of a lock-rod reciprocated by said switch-points and a lock-bolt reciprocated by said switch-operating mechanism, an electric switch, a rod reciprocated by said switch-points, and means actuated by said last-mentioned rod for closing said electric switch when the switch-points are in their proper position and locked, and for opening said electric switch when said switch-points are not locked or when they are not in their proper position.

3. The combination with switch-points, a motor and mechanism for moving said switch-points of an electric switch, means for controlling said electric switch by mechanism operated by said motor and independent means for controlling said electric switch by mechanism operated by the movements of said switch-points.

4. The combination with switch-points, a motor and mechanism for moving said switch-points, an electric switch and means for controlling said electric switch by mechanism operated by said motor, a plurality of signals and signal-circuits and a plurality of contacts on said electric switch, whereby one or more signal-circuits are made capable of being established by said electric switch when the switch-points are in one position and one or more signal-circuits made capable of being established when said switch-points are in the reverse position.

5. The combination with switch-points, a motor and mechanism for moving said switch-points, an electric switch, means for controlling said electric switch by mechanism operated by said motor, a plurality of signals and signal-circuits and a plurality of contacts on said electric switch for selecting one or more of said signals when the switch-points are in one position and one or more signals when he switch-points are in the other position, and independent means for establishing or disestablishing the signal-circuits operated by the movement of said switch-points.

6. In combination with the switch-points of a rail-switch and mechanism for moving the same, a switch-box, a plurality of signals, and of signal-circuits capable of being established through said switch-box, means for selecting between said circuits through said switch-box through the switch movement, and means for finally establishing or disestablishing the signal-circuits governed by the position of the switch-points.

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

WINTHROP K. HOWE.

Witnesses:
F. L. DODGSON,
J. WM. ELLIS.