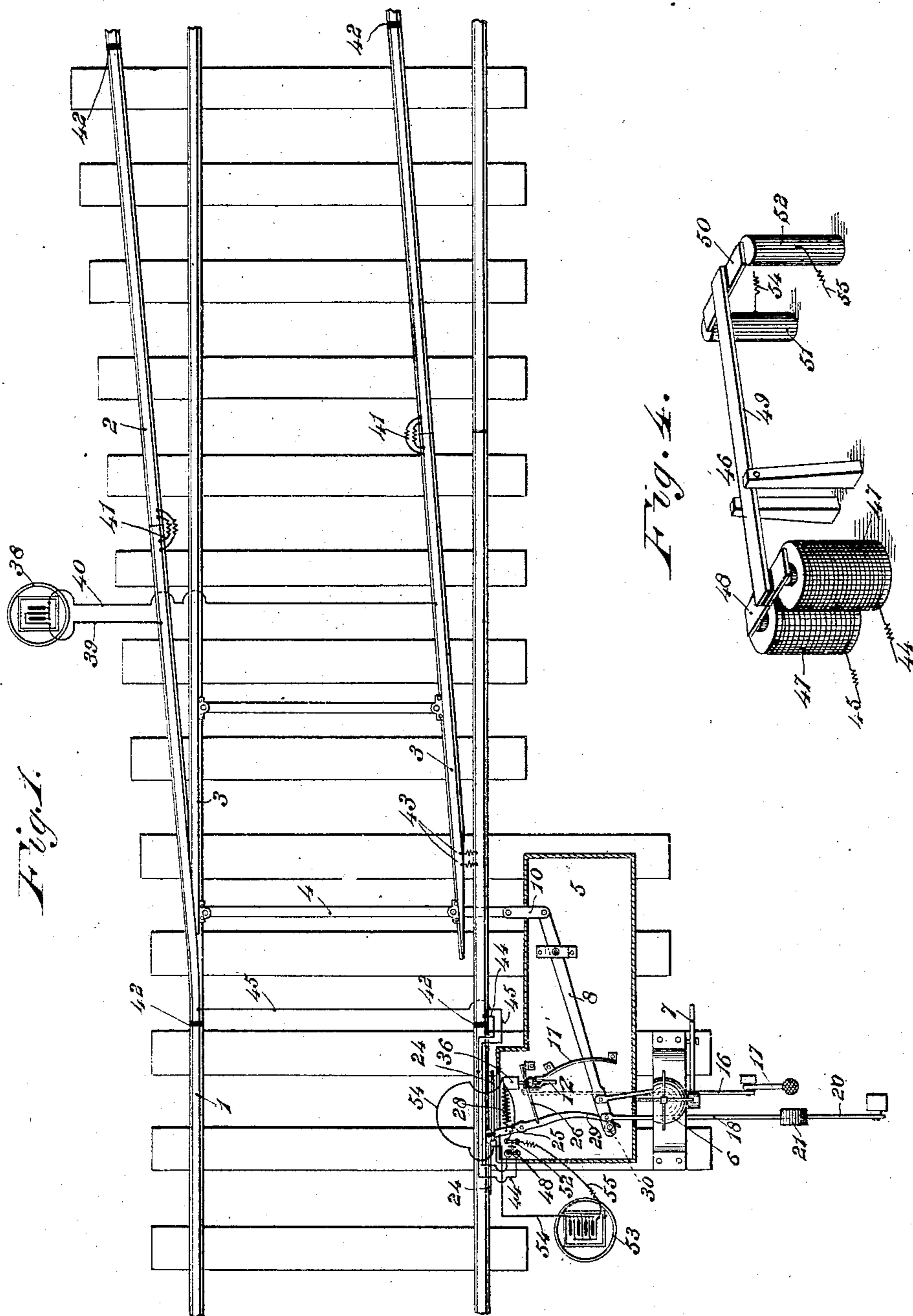


No. 842,930.

PATENTED FEB. 5, 1907.

T. K. WILSON.  
RAILWAY SWITCH.  
APPLICATION FILED NOV. 18, 1906.

3 SHEETS—SHEET 1.



*WITNESSES*

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3 SHEETS—SHEET 2.

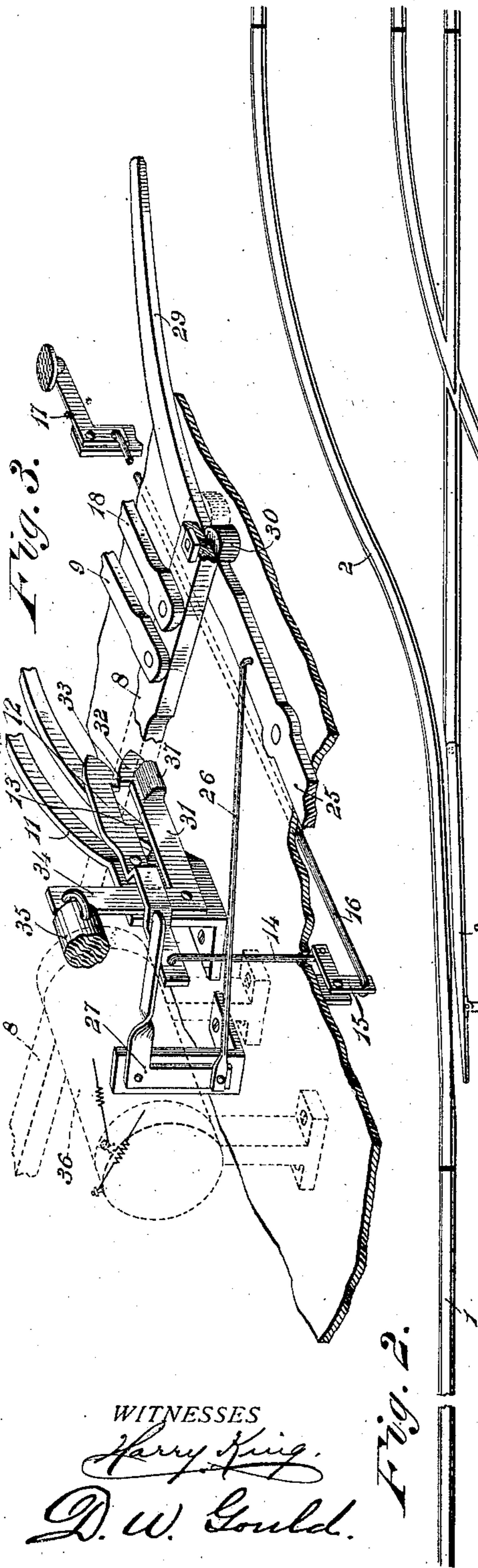


Fig. 2.

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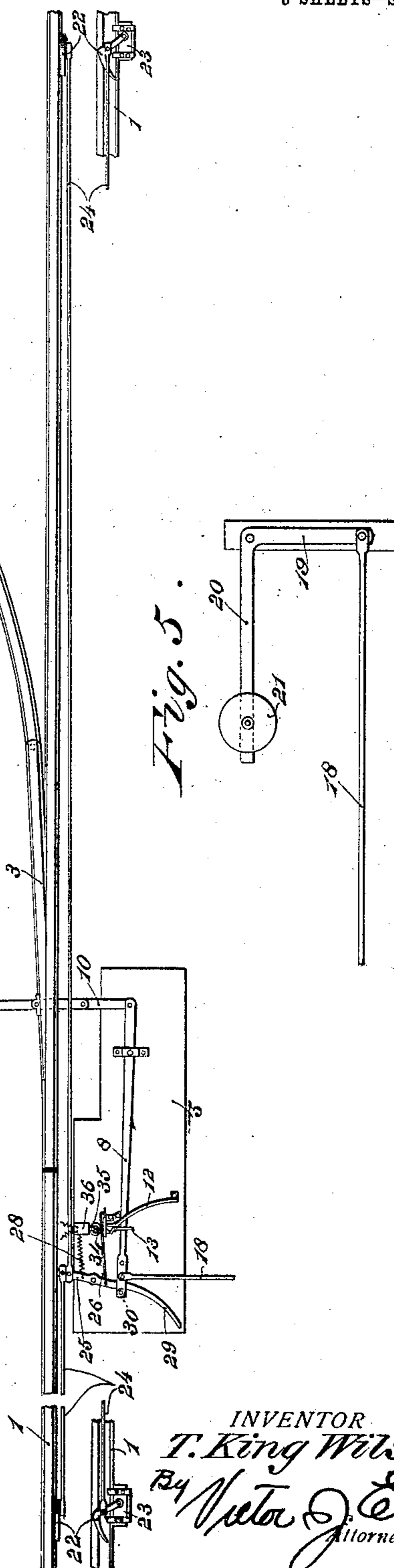


Fig. 3.

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3 SHEETS—SHEET 3.

Fig. 8.

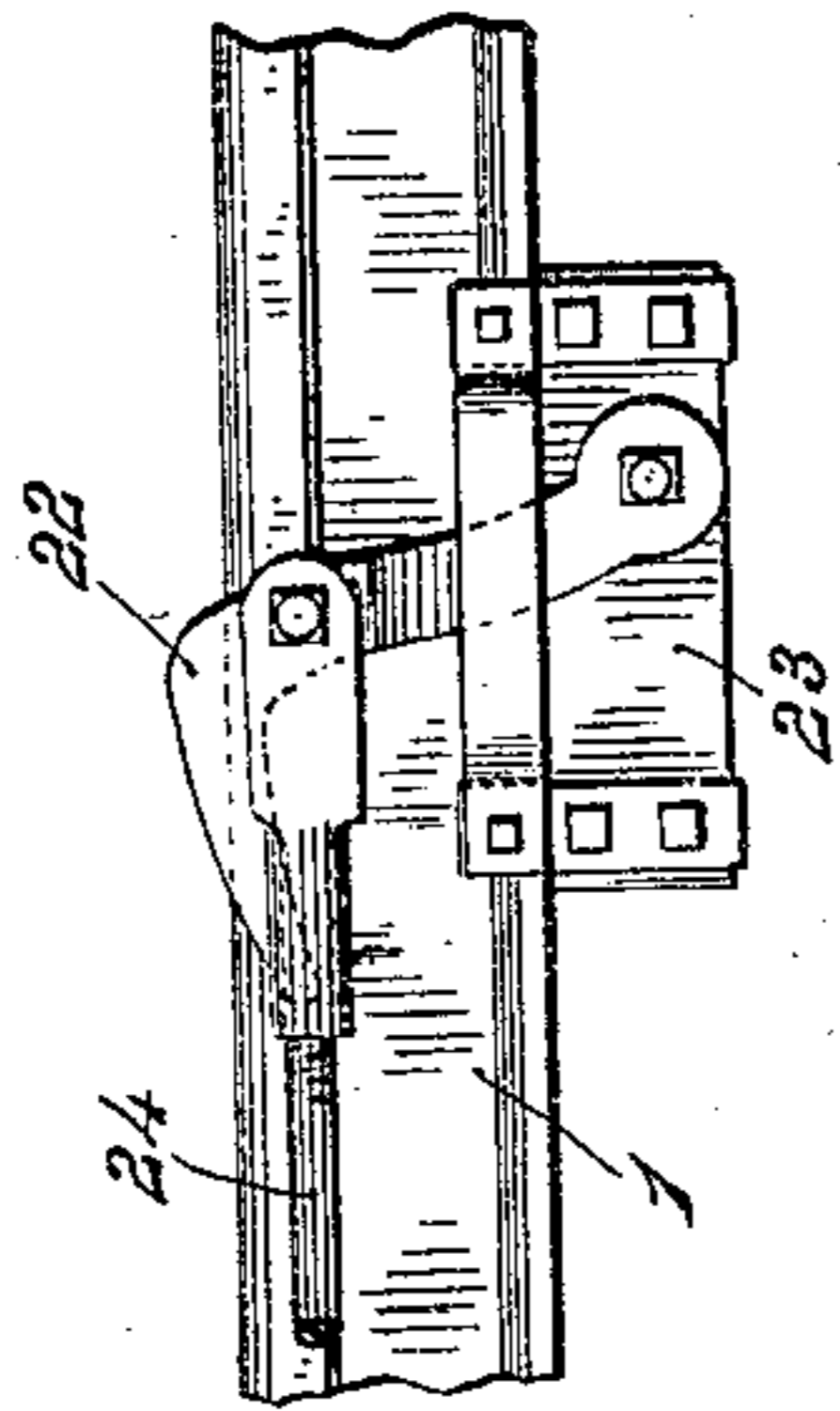


Fig. 7.

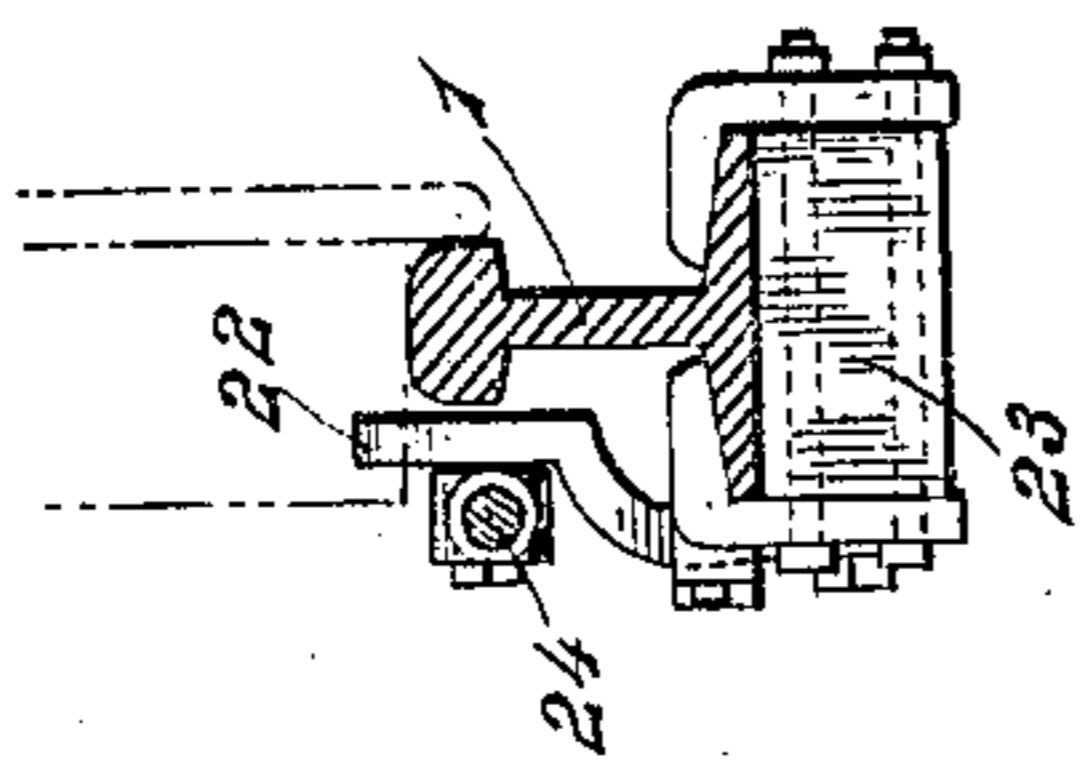


Fig. 6.

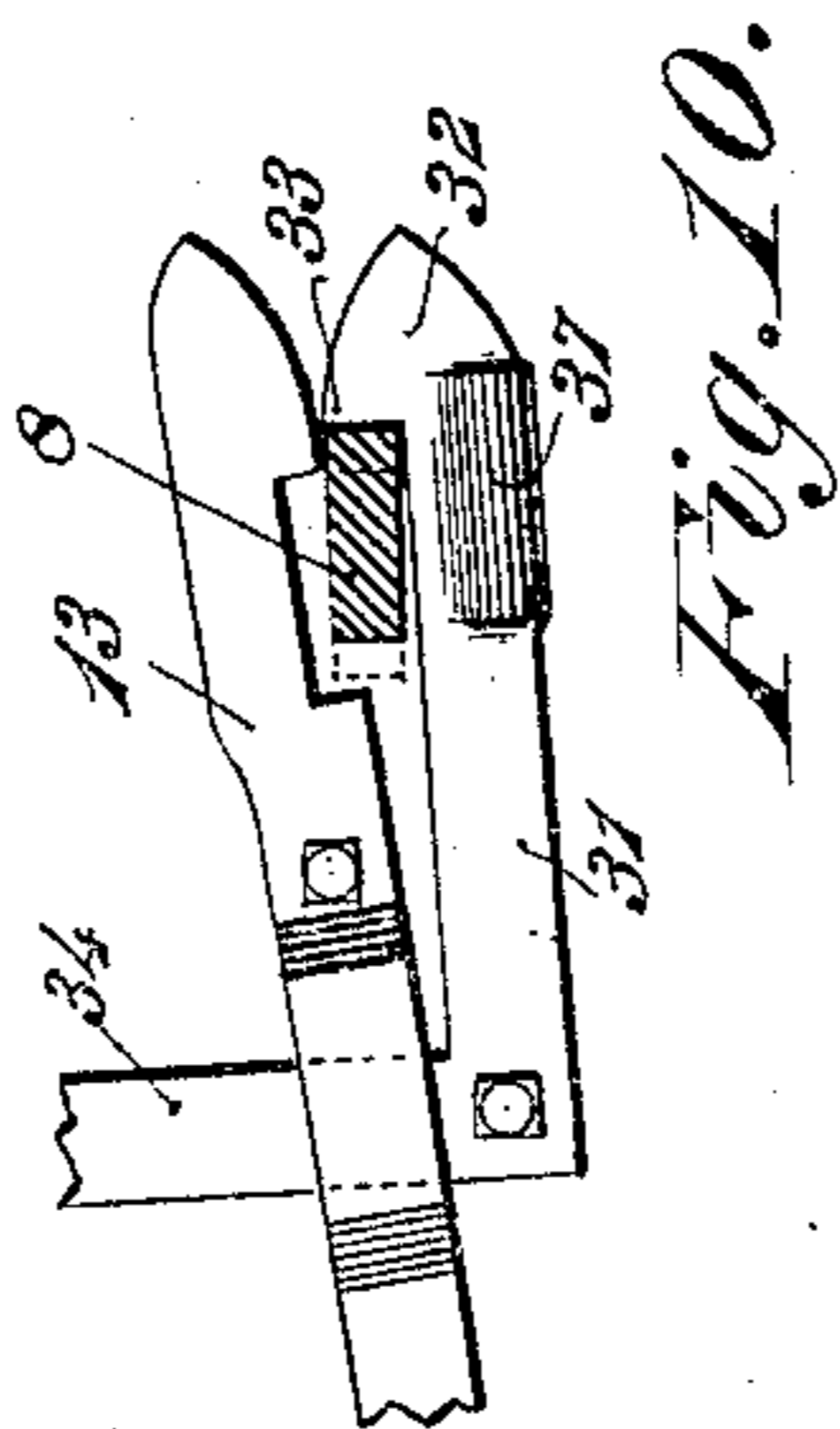
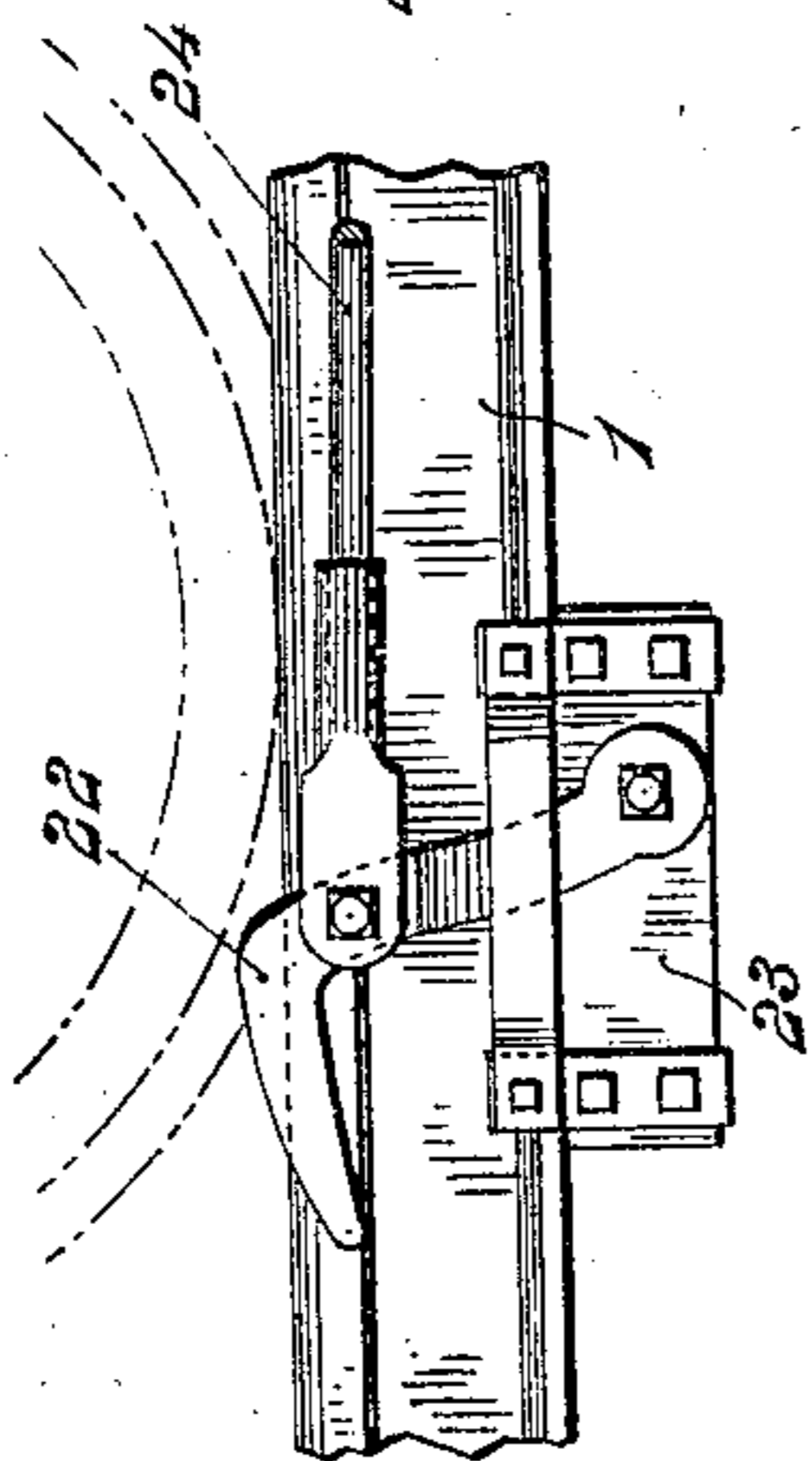


Fig. 10.

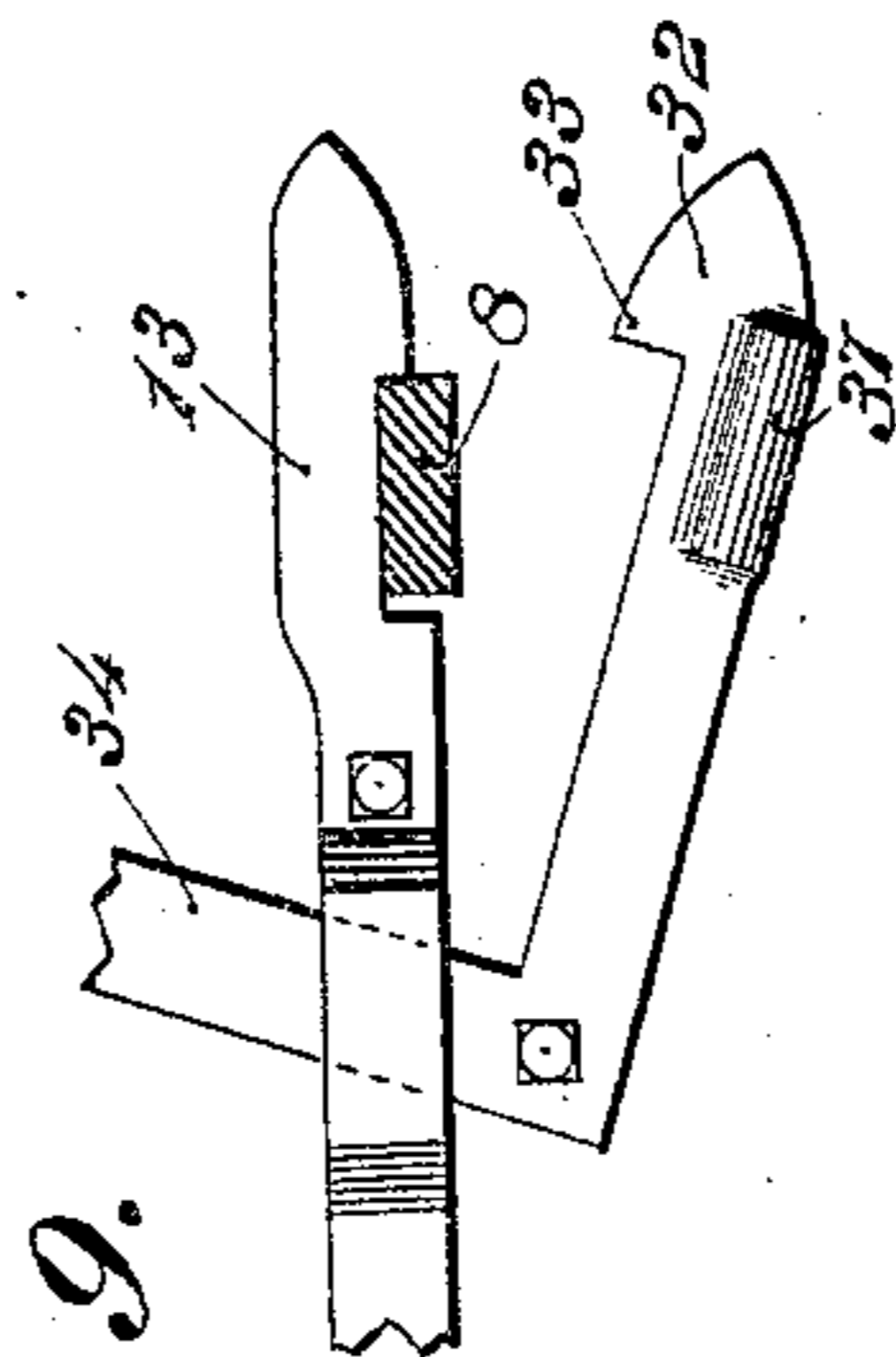


Fig. 9.

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# UNITED STATES PATENT OFFICE.

THOMAS KING WILSON, OF CHILLICOTHE, OHIO.

## RAILWAY-SWITCH.

No. 842,930.

Specification of Letters Patent.

Patented Feb. 5, 1907.

Application filed November 18, 1905. Serial No. 288,000.

*To all whom it may concern:*

Be it known that I, THOMAS KING WILSON, a citizen of the United States, residing at Chillicothe, in the county of Ross and State of Ohio, have invented new and useful Improvements in Railway-Switches, of which the following is a specification.

The invention relates to an improvement in railway-switches, and particularly to a means for operating the switch.

The main object of the present invention is the production of switch-operating means constructed and arranged to permit manual closing or opening of the switch and to permit automatic closing of the switch in the movement of the train.

A further object of the invention is the production of means by which the switch may be automatically locked open to the exclusion of the automatic closing means, whereby the passage of a train onto or from the siding is properly provided for.

The preferred details of construction will be described in the following specification, reference being had particularly to the accompanying drawings, in which—

Figure 1 is a plan view illustrating a track and siding of my improved operating mechanism, the switch being shown closed. Fig. 2 is a similar view illustrating particularly the automatic closing mechanism for the switch. Fig. 3 is an enlarged perspective detail showing the switch-operating mechanism. Fig. 4 is a perspective of the relay used in the automatic locking mechanism. Fig. 5 is a view in side elevation showing the weighted lever for closing the switch. Fig. 6 is a view in elevation, illustrating particularly the wheel-operated lever of the automatic closing mechanism. Fig. 7 is a transverse section of the same. Fig. 8 is a view similar to Fig. 6, illustrating the lever arranged beyond the switch relative to the lever shown in Fig. 6. Fig. 9 is a detail in elevation, showing the switch-operating lever in the locked position assumed under the manual operation of the switch. Fig. 10 is a similar view showing the switch-operating lever in the locked position assumed in the operation of the automatic locking mechanism.

Referring to the drawings, wherein like parts are indicated by similar reference-numerals throughout the several views, my improved switch-operating mechanism is designed for connection with a main track 1

and a siding 2, the switch-points 3 being connected by the usual tie or cross-bar 4.

The operating mechanism proper comprises several distinct parts and for the purposes of the following description is divided into the manual operating means, the automatic closing means, and the automatic locking means, the essential parts of which mechanisms are mounted within a switch box or casing 5, positioned adjacent the switch.

*The manual operating mechanism.*—The manual operating mechanism is arranged for control from the usual or any preferred type of switch-stand 6, the interior mechanism of which is operated through the medium of a handle 7. A switch-operating lever 8 is pivotally mounted within the switch-box and connected with the operating mechanism of the switch-stand by a rod 9, secured to said lever near one end thereof, the opposite end of the lever being connected to the switch-bar 4 by a link 10, the lever 8 being so mounted within the switch-box as to provide an excess of length in favor of the mechanism in the switch-stand, whereby to increase the effect in power of said switch-stand mechanisms, as is obvious. A slotted guide 11 is secured within the switch-box to receive and guide the lever 8, insuring the operation of said lever in the same plane in all movements. A latch 12 is pivotally supported on the inner or track end of the guide, its outer end being weighted and its lower edge notched at 13 adjacent said weighted end for the reception of the lever 8. The inner end of the latch is connected by a rod 14 to one arm of a pivotally-supported bell-crank lever 15, the terminal of the other arm of which is connected to a rod 16, extending downwardly beyond the switch-box and connected adjacent the switch-stand to a foot-lever 17, pivotally mounted on a suitable support, and the construction being such that a depression of said foot-lever will draw downward the inner end of the latch 12, and thereby release the lever 8 from the notch 13 in said latch.

The lever 8 beyond the rod 9, with relation to the pivot of the lever, is connected to a rod 18, which extends through an opening in the side wall of the switch-box, and terminally connected at its outer end to an arm 19 of a bell-crank lever 20, pivoted upon a suitable support and provided at the end of its free arm with a weight 21. The length of the arm 20 and the position and size of the weight

21 is sufficient to redraw the lever 8 to normal position when released from the latch 12, thereby providing means for returning the switch-points to closed position when desired.

The above-described mechanism comprises, essentially, means for manually operating the switch-points, in the use of which the operator by actuating the mechanism of the switch-stand through movement of the handle 7 causes the rod 9 to move the approximate end of the lever 8 inward until it rides beneath the weighted end of the latch 12 and into the notch 13, where it is held against accidental return movement. The opposite end of the lever, through the link 10, as in the operation described, moves the switch-points to open position, as illustrated in Fig. 2. When desiring to close the switch, the operator will depress the treadle 17, thereby elevating the outer or locking end of the latch 12 and releasing the lever 8 therefrom, at which time the weight 21 will return to normal position by gravity and through the connections described draw the connected end of the lever 8 to its normal position, moving the opposite end of the lever to close the switch.

*Automatic closing mechanism.*—Adjacent the rail of the main track next the switch-stand, beyond the switch-points in both directions, are mounted wheel-operating levers 22, preferably of approximately bell-crank form and pivotally supported in brackets 23, secured to the rail or to other desirable fixtures adjacent thereto. The levers are pivotally connected at the terminal of one arm and the remaining arm being reduced in size toward its free end and rounded at the junction of said arms, so that the point of said lever which is the curved portion forming the junction between the arms will normally project above the tread of the rail, while the free end of the approximately horizontal arm of the lever is at all times below the tread-surface of the rail, thereby avoiding any contact between the wheel and the free end of this arm and insuring that the contact of the wheel with the apex of the lever will rock said lever on its pivot. Rods 24 are connected with the respective wheel-operating levers and project toward the switch-box, being there connected to one end of a releasing-lever 25, pivotally supported within the switch-box. To the lever beyond the fulcrum relative to the connection of the rods 24 thereto is connected one end of a rod 26, the opposite end of which is connected to one arm of a bell-crank lever or trip 27, pivotally secured upon a suitable support rising from the base of the switch-box, the free arm of said trip overlying and normally contacting with the inner end of the latch 12. By preference the trip is constructed of sheet metal and the end bearing upon the latch is twisted

into a plane transverse to its normal plane to provide a comparatively broad bearing upon the latch. In the operation of the automatic closing mechanism above described, assuming the switch open by manual or other operation, the truck-wheels contacting with the apex of either of the levers 22 will move the inner end of the releasing-lever 25 in a direction away from the switch-points as the mechanism is illustrated, and thereby move the rod 26 in the opposite direction. This movement of the rod rocks the trip upon its pivot and causes its free end to depress the inner end of the latch 12, releasing the switch-operating lever 8 from said latch and permitting the weight 21 to move the switch to closed position, as hereinbefore described in connection with the manual operating mechanism.

A spring 28 is connected to the lever 25 adjacent the connection of the rods 24 thereto and to a fixed part of the switch-box, serving, when permitted, to return the lever 25 to normal position, and thereby project the operative ends of levers 22 above the tread-surface of the rail. It is obvious, however, that from a mechanical point of view the levers 22 should be arranged to assume a relative position above the tread-surface of the rail only when the switch is open, as otherwise constant passage of trains above said levers would soon render them ineffective. To gain this result, the outer or free end of the releasing-lever 25 is curved in a direction away from the trip 27, as at 29, and the adjacent end of the switch-operating lever 8, which in practice overlies said lever 25, is provided with a roller 30, designed to bear at all times on the vertical edge of the lever to oppose or prevent its resetting movement under the influence of the spring 28. As the operating-lever 8 is actuated to open the switch the roller 30 moves inward in contact with the approximate edge of the releasing-lever, and owing to the curvature of said edges said lever 25 will be free to be reset by the spring 28 when the operating-lever has moved to a position within the notch 13 of the latch 12, so that when the switch has been manually opened the releasing-lever has been moved under the influence of the spring 28 to project the lever 22 above the tread-surface of the rail, in which arrangement of the parts the automatic closing mechanism is in position to be affected and operated by a passing train. Upon the release of the operating-lever 8, however, its return to normal position under the influence of the weight 21 or roller 30, carried by said lever, riding on the curved edge of the releasing-lever 25, will force the free end of said lever in a direction against the tension of the spring 28, thereby causing the points of the levers 22 to be withdrawn below the tread-surface of the rail, preventing contact with the wheels traveling thereon.

It will thus be seen that the levers 22 are in operative position only when the switch has been moved to open position and are held in inoperative position when the switch is closed.

*The automatic locking and releasing mechanism.*—The mechanism just described provides a simple automatic means for closing the switch upon an approach of the train from either direction, thereby guarding the train from an accident in the event the switch has been left open through accident or carelessness. It is obvious, however, that in the event a train is on the siding desiring to take the main track or on the main track and desiring to take the siding that means must be provided for preventing the closing operation of the switch by the travel of the train above the levers 22, as otherwise the switch would be automatically closed against passage of the train. To this end the means about to be described has been provided, which is constructed and arranged to automatically lock the switch in open position during the passage of the train and simultaneously render the automatic closing device non-effective for permitting closing of the switch and also release the automatic lock to permit automatic closing of the switch as soon as the train has passed into or out of the siding.

A latch 31 in bell-crank form is pivotally mounted on the guide 11 in rear of and below the pivotal point of the latch 12. The horizontal arm of the latch, hereinafter termed the "power-latch," is formed at its outer end with a head 32, extending upwardly beyond the edge of the arm to provide a shoulder 33, serving as a stop to engage the switch-operating lever 8. The horizontal arm of the power-latch is in direct vertical alinement with the latch 12; but the engaging shoulder 33 of the power-latch is in a plane slightly beyond the holding edge of the notch 13 in the latch 12 relative to their pivotal supports. The upper end of the vertical arm 34 of the power-latch is loosely connected with a core 35 of an electromagnet 36, the coil of which is suitably supported from the base of the switch-box. The free end of the horizontal arm of the power-latch is weighted at 37 to maintain said end in a lowered or non-locking position, it being understood that relative to the lever 8 the latch 12 locks the same from above, while the power-latch is operative from below.

In order to avoid any possibility of short-circuiting or the energizing of the coil 36 at the wrong time, I have provided two independent circuits for the operation of the automatic locking means, one a low-voltage circuit closed at all times and comprising a track-circuit and the other a high-voltage circuit normally opened and including the electromagnet 36. The low-voltage circuit is energized from a generator 38, the conduc-

tors 39 and 40 of which lead, respectively, to and form electrical connection with the track-rails of the switch, as clearly shown in Fig. 1. The rails of the switch are included in the circuit, preferably two or more of such rails, by electrically bonding the joints at 41, the rail-sections beyond the bonded connections being insulated, as at 42. The rail-sections forming part of the circuit include a portion of the main track as well as the siding. The switch-point adjacent one of the main rail-sections included in the circuit is electrically connected with said rail-sections by wires 43, and from said main rail-section extends a conductor 44. The rail-section of the opposite track-rails included in the circuit is connected by a connector 45, extending transverse the track, and, together with the connector 44, projects within the switch-box. A bar 46 is mounted within the switch-box, the coils 47 of which are included in the low-voltage circuit by connection with the wires 44 and 45. The armature 48 of the bar is secured to the short end of a lever 49, pivotally supported from the base of the switch-box and carrying at its opposite end a contact-bar 50, arranged when in proper position to bridge contact-posts 51 52. The lever 49 is so mounted that its longer end is in favor of the contact-plate 50, so that upon the deenergizing of the coils 47 the plate 50 will gravitate toward and bridge the contact-posts 51 52. The high-voltage circuit includes a generator 53, the conductors 54 55 of which are connected, respectively, to the contact-posts 51 52, said conductors including the electromagnet 36 in its circuit. As thus described, it will be seen that the low-voltage circuit is a normally closed one, including a portion of the track-rails and the coils 47 of the relay, while the high-voltage circuit in the closed condition of the low-voltage circuit through the relay is normally opened, being broken at the contact-posts 51 52.

The operation of the automatic locking mechanism is as follows: The operator, by manual manipulation of the switch-stand mechanism, opens the switch and by the continual pressure upon the handle 7 holds the switch open until the wheels of the first truck of the engine or train contact with that portion of the track included in the track-circuit. Upon this contact a short circuit is formed for the low-voltage circuit shunting the current through the wheels and axle of the truck. This deenergizes the coils 47 and permits the contact-bar 50 to bridge the posts 51 52, thus closing the high-voltage circuit and energizing the electromagnet 36. The magnetic influence of the current attracts the core 35, rocking the power-latch upon its pivot and causing its free end to ride upward into contact with the free end of the latch 12 and elevate said latch from locking engagement with the switch-operating

4  
 lever 8. As the lever is thus freed from the latch 12 it tends to move toward a normal position under the influence of the weight 21; but the shoulder 33 of the power-latch rests in the path of this movement of the lever and holds the lever from other than a comparatively slight movement. This slight movement of the lever, however, is of vital importance, and for this reason the operative edge or shoulder of the power-latch is in a plane in advance of the operative shoulder of the latch 12. The slide movement permitted the lever in the operation described is sufficient to move said lever wholly from the influence of the latch 12, so that said latch cannot by any possibility reengage and lock the lever after a further opening movement of the parts, as clearly seen by reference to Fig. 10. The switch-points are thereby locked in open position during the travel of the train thereabove, as each successive truck-wheel will shunt the track-circuit and maintain the high-voltage circuit closed. Immediately, however, the last truck passes from the rails included in the track-circuit the normal path of said circuit is established, the coils 47 energized, and the armature 48 attracted. This elevates the bridge between the posts 51 52, breaking the high-voltage circuit, deenergizing the electromagnet 36, and permitting the weight 37 at the free end of the power-latch to return the latch to normal position. This movement of the latch frees the switch-lever 8 for the influence of the weight 21, which operates to move the switch to closed position, as hereinbefore described.

As both the manual and automatic mechanism for closing the switch, or more properly for releasing the switch to the influence of the closing-weight, operates through the latch 12, and as the operating-lever is wholly moved from the influence of said latch in the operation of the locking mechanism above described, it is obvious that during the shunting of the track-circuit by the passage of a train thereabove the switch cannot under any circumstances be either manually or automatically closed, so that the construction described is thoroughly effective for preventing any derailing accidents during the travel of the train from the siding onto the main track or from the main track onto the siding.

From the above description, taken as a whole, it will be seen that I have provided simple and effective means for operating a switch so constructed and arranged as to permit manual opening or closing of the switch, automatic closing of the switch to the exclusion of the manual means, and locking means for the switch whereby the switch may be maintained in open position when desired, to the exclusion of both the manual and automatic closing means. It

will be further noted that the automatic closing means in no wise interferes with or affects the manual closing means and that a restoration of the parts to normal condition after operation of the automatic locking means will without further manipulation on the part of the operator place the parts in complete normal position, ready to be operated manually or automatically.

The various parts of the device may be constructed of such material as desired, it being understood that the relative proportions of the various parts of the arrangement of the operating mechanism as a whole relative to the position of the switch-points is wholly immaterial so far as the present invention is concerned, the construction being preferably such as to permit the train in the operation of the automatic closing mechanism and of the automatic locking mechanism to influence these mechanisms at such a distance from the switch-points as will enable the engineer to gain control of his train in the event of failure of the mechanism. It is to be understood, of course, that any of the preferred form of signaling devices may be connected to the switch-points to serve as notice to the engineer of the position of the switch.

Having thus described the invention, what is claimed as new is—

1. The combination with a switch, of means for opening the switch, means for locking the switch in open position, and means operated in the movement of the train upon the track to release said lock, said means serving to actuate an auxiliary locking means for the switch.

2. The combination with a switch, of means for manually opening said switch, means for locking the switch in open position, train-operated means for releasing the lock, and means for rendering the train-operated means non-effective to release the lock.

3. The combination with a switch, of means for locking the switch in open position, train-operated lock-releasing means, and automatic means for rendering the releasing means non-effective.

4. The combination with a switch, of means for locking the switch in open position, train-operated lock-releasing means, and automatic means for rendering the releasing means non-effective, said means being operative only when the switch is open.

5. The combination with a switch, of means for locking said switch in open position, and auxiliary means for locking the switch in open position during the travel of the train thereon, said latter means releasing the first-mentioned locking means.

6. The combination with a switch, of means for normally locking the switch in open position, and electrically-operated aux-

iliary locking means to hold the switch in open position to the exclusion of the normal locking means.

7. The combination with a switch, of means for normally locking the switch in open position, electrically-operated auxiliary locking means to hold the switch in open position to the exclusion of the normal locking means, said auxiliary locking means including a normally closed circuit, and a normally open circuit, the closed circuit being adapted to be shunted by the passage of the train to permit closing of the open circuit.

8. The combination with a switch, of an operating-lever therefor, means for setting the lever to open the switch, means for resetting the lever to close the switch, means for locking the lever in set position, track-operated means to release the lock, and auxiliary locking means operated by the passage of a train to prevent resetting of the lever under the influence of the train-operated means.

9. The combination with a switch, of an operating-lever therefor, means for setting the lever to open the switch, means for resetting the lever to close the switch, a lock to hold the lever in set position, train-operated means to release the lock, and electrically-operated auxiliary locking mechanism for the lever whereby to maintain said lever in set position without regard to the operation of the train-operated means.

10. The combination with a switch, an operating-lever therefor, means for setting the lever to open the switch, means for resetting the lever to close the switch, a lock for maintaining the lever in set position, means for releasing the lock, and electrically-energized train-operating means for locking the lever in set position during the passage of the train onto or from the switch, said latter means releasing the first-mentioned locking means.

11. The combination with a switch, an operating-lever therefor, a catch for locking said lever in set position to maintain the switch open, means connected with the catch to release the same in the passage of a train on the track, and a power-latch to engage the operating-lever during the passage of a train to or from the switch.

12. The combination with a switch, an operating-lever therefor, a catch for locking said lever in set position to maintain the switch open, means connected with the catch to release the same in the passage of a train on the track, and an electrically-operated power-latch to engage the operating-lever during the passage of a train to or from the switch.

13. The combination with a switch, an operating-lever therefor, a catch for locking said lever in set position to maintain the switch open, means connected with the catch to release the same in the passage of a train on the track, and an electrically-operated

power-latch to engage the operating-lever during the passage of a train to or from the switch, said power-latch releasing the operating-lever from the main latch.

14. The combination with a switch, of an operating-lever therefor, a main latch for locking said lever in set position, train-operated means for disengaging said latch from the lever, and electrically-operated means for disengaging said main latch from the lever and simultaneously locking the lever against return to normal position.

15. The combination with a switch, of an operating-lever therefor, a main latch for locking said lever in set position, train-operated means for disengaging said latch from the lever, and electrically-operated means for disengaging said main latch from the lever and simultaneously locking the lever against return to normal position, said latter means being operated by the passage of a train to or from the switch.

16. The combination with a switch and an operating-lever therefor, a main latch for locking said lever in set position, train-operated means for releasing said latch, a power-latch, electrically-operated means to move the power-latch into engagement with the lever and simultaneously disengage the main latch therefrom, said means including a normally closed track-circuit, and a normally open latch-circuit in the track-circuit and adapted to be closed by the passage of a train to or from the switch.

17. The combination with a switch, of an operating-lever therefor, a main latch for locking the lever in set position, a power-latch adapted in operation to engage and release the main latch and simultaneously lock the lever against movement, an electromagnet connected with the power-latch, a circuit including said magnet and having spaced terminal contacts, a closed circuit including the track, a relay included in said circuit, a lever connected to the armature of said relay, and a bridge-piece connected to said lever and arranged above the spaced contacts of the electromagnet-circuit, said closed circuit being shunted in the passage of the train to or from the switch to deenergize the relay and close the electromagnet-circuit.

18. The combination with a switch, of an operating-lever therefor, a main latch to lock the lever in set position, a power-latch adapted to release the main latch and simultaneously lock the lever against resetting movement, a normally open circuit including an electromagnet connected to the power-latch, and a normally closed circuit including a relay and the track-rails, said closed circuit being shunted from the relay in the passage of a train to or from the switch, and means operated by the relay to close the normally open circuit and operate the power-latch upon the deenergizing of said relay.

19. The combination with a switch, of an operating-lever therefor, a main latch for locking said lever in set position, a power-latch for releasing the main latch and locking the lever against resetting movement, a normally open latch-circuit including an electromagnet connected with the latch, a normally closed track-circuit including a relay and the track-rails, said track-circuit being shunted from the relay in the passage of a train on the track, and a gravity-operated connection to close the latch-circuit upon the deenergizing of the relay.

20. The combination with a switch, of an operating-lever therefor, a main latch for locking said lever in set position, a power-latch for releasing the main latch and locking the lever against resetting movement, a normally open latch-circuit including an electromagnet connected with the latch, a normally closed track-circuit including a relay and the track-rails, said track-circuit being shunted from the relay in the passage of a train on the track, and a gravity-operated connection to close the latch-circuit upon the deenergizing

of the relay, said relay being energized and the latch-circuit broken after the passage of the train beyond the circuit including rails whereby to release the operating-lever from the influence of the power-latch.

21. The combination with a switch, of an operating-lever therefor, a main latch for locking said lever in set position, a power-latch for releasing the main latch and locking the lever against resetting movement, a normally open latch-circuit including an electromagnet connected with the latch, a normally closed track-circuit including a relay and the track-rails, said track-circuit being shunted from the relay in the passage of a train on the track, and a gravity-operated connection to close the latch-circuit upon the deenergizing of the relay, said latch-circuit being of higher voltage than the track-circuit.

In testimony whereof I affix my signature in presence of two witnesses.

THOMAS KING WILSON.

Witnesses:

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H. J. DU BOIS.