(No Model.) 4 Sheets—Sheet 1.

# J. T. HAMBAY.

## RAILWAY SWITCH AND SIGNALING APPARATUS.

No. 329,643. Patented Nov. 3, 1885.

Fig. 1.

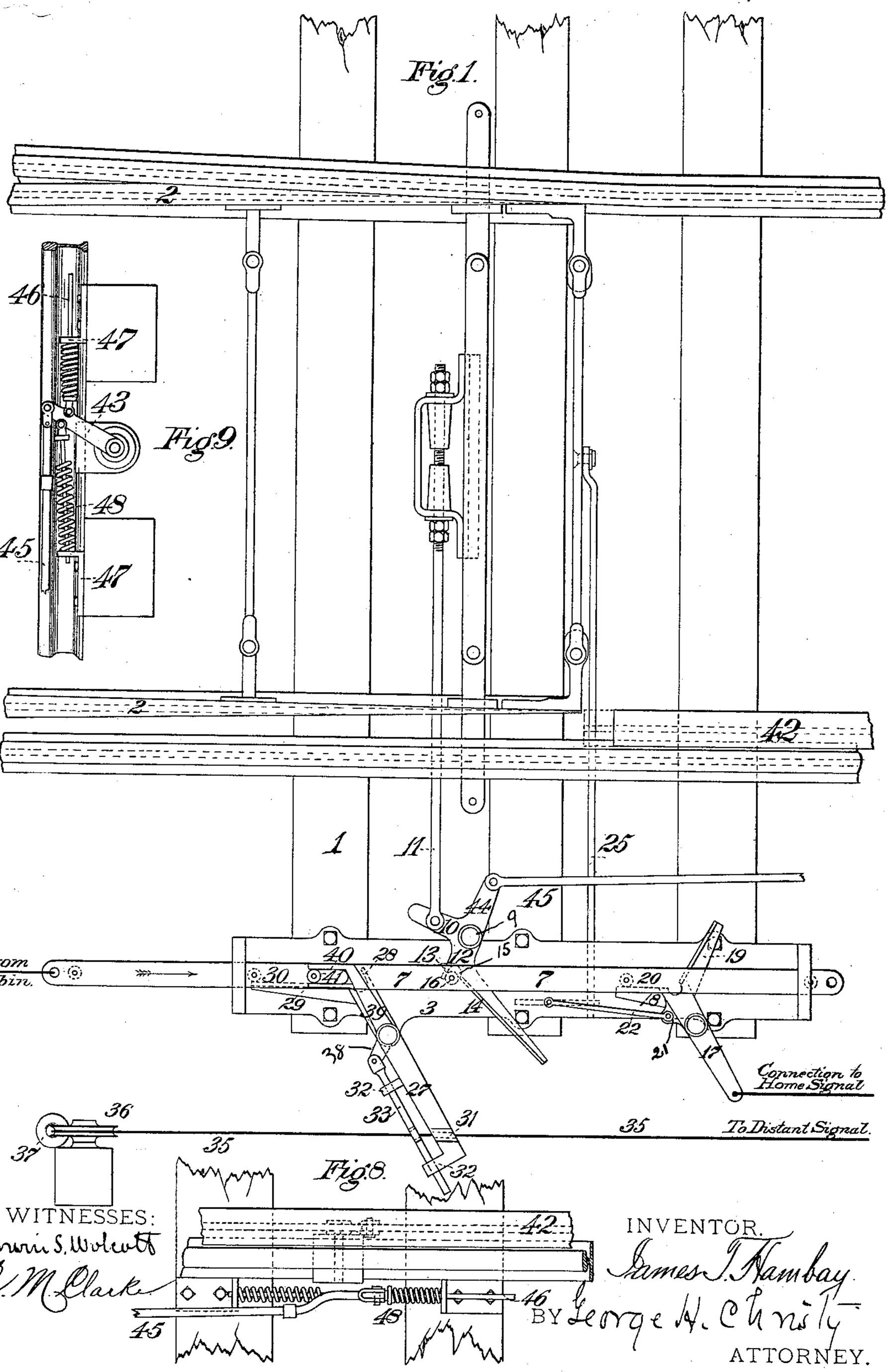


Fig. 9.

Fig. 8.

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Fig. 3.

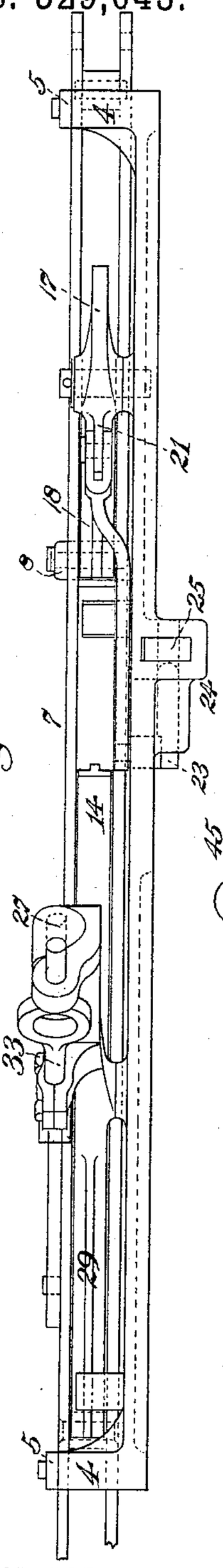
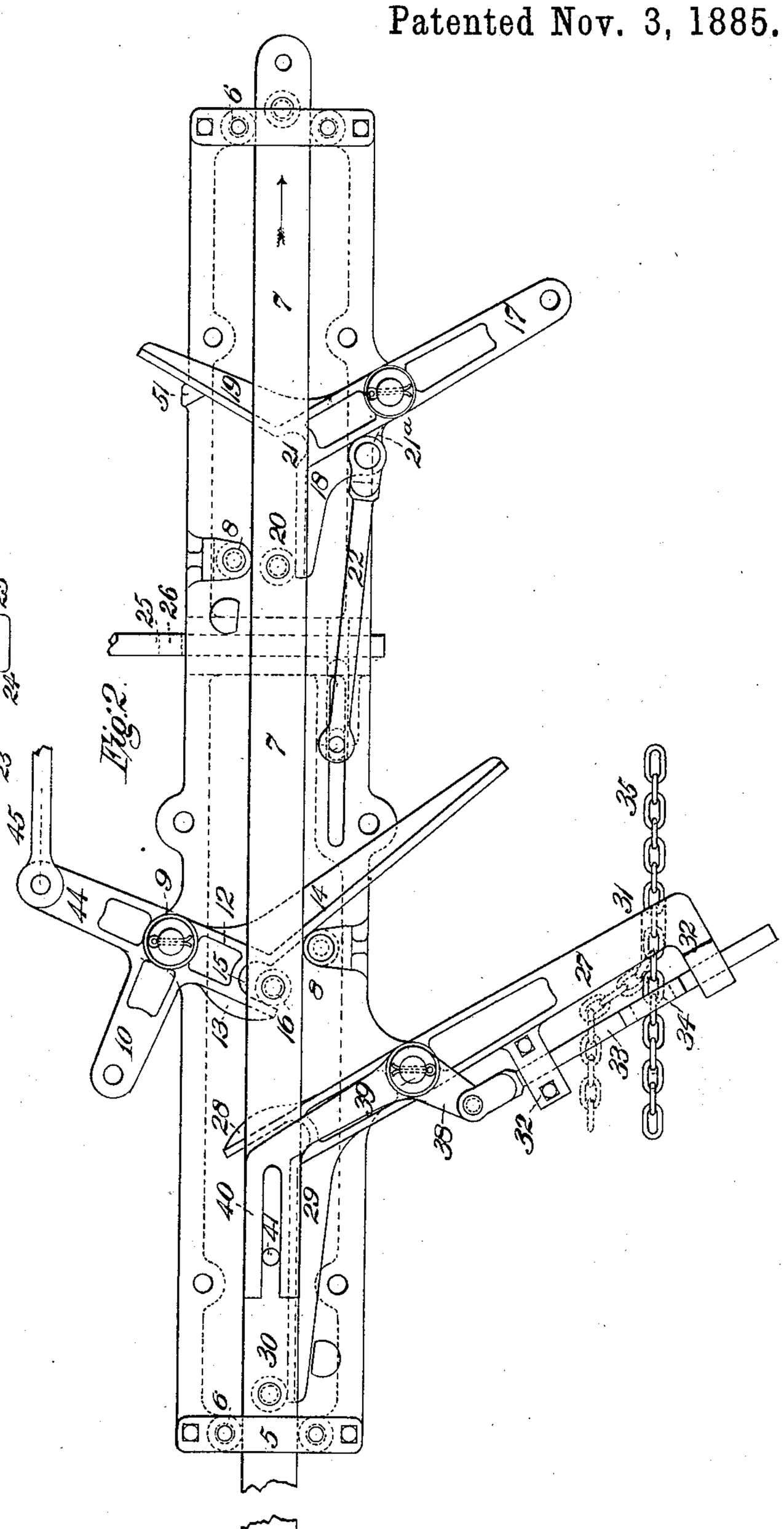



Fig. 2.

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## RAILWAY SWITCH AND SIGNALING APPARATUS.

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Fig. 5.

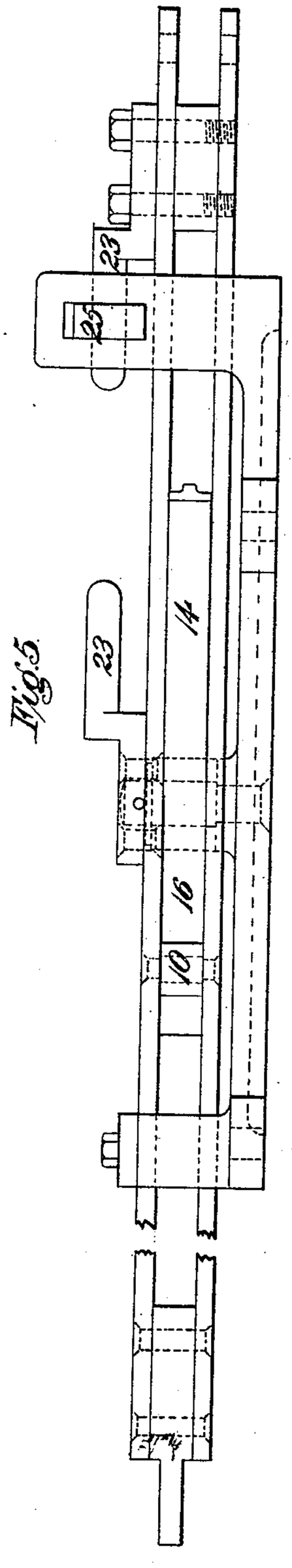
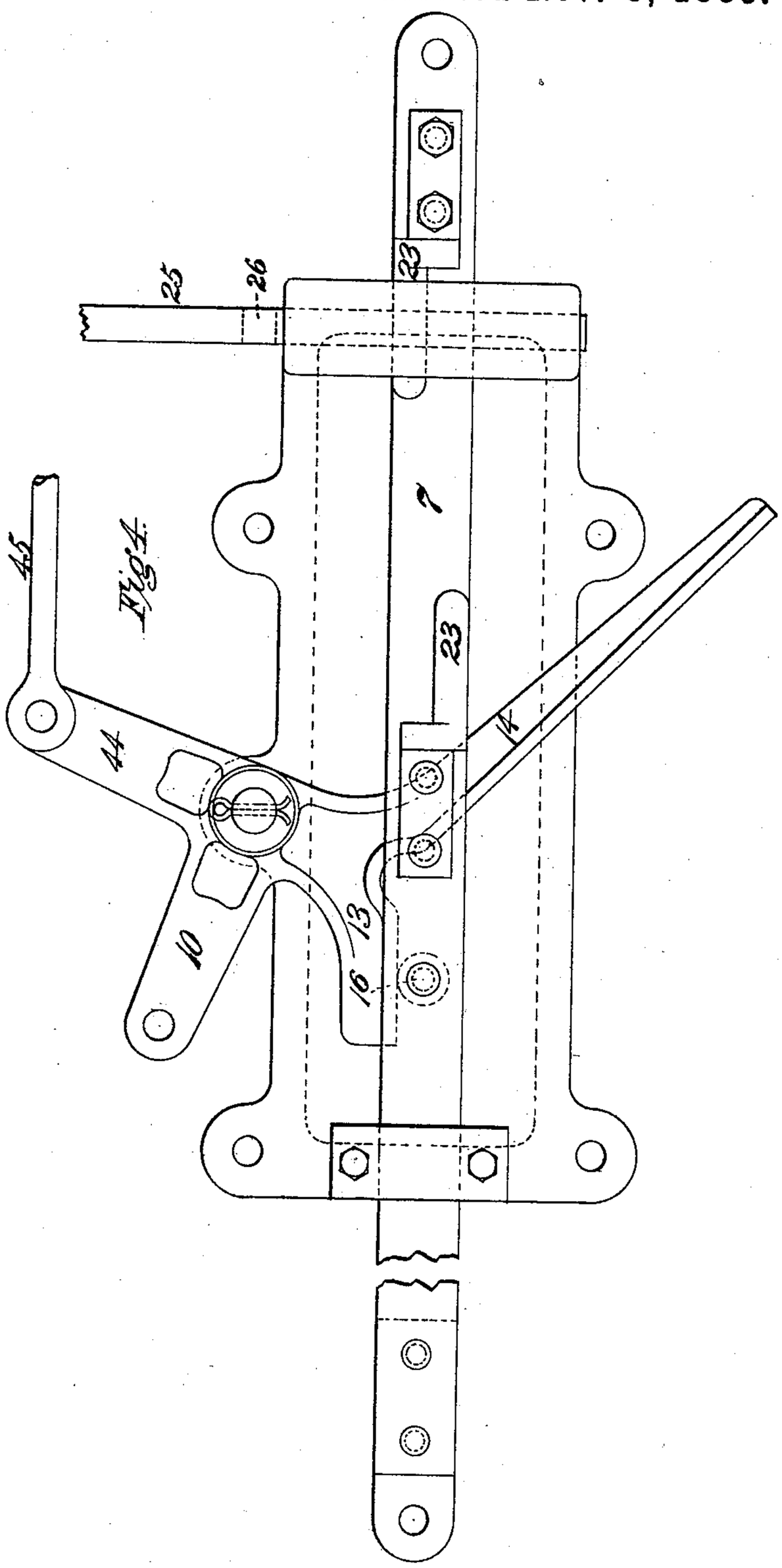



Fig. 4.

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4 Sheets—Sheet 4.

# J. T. HAMBAY.

## RAILWAY SWITCH AND SIGNALING APPARATUS.

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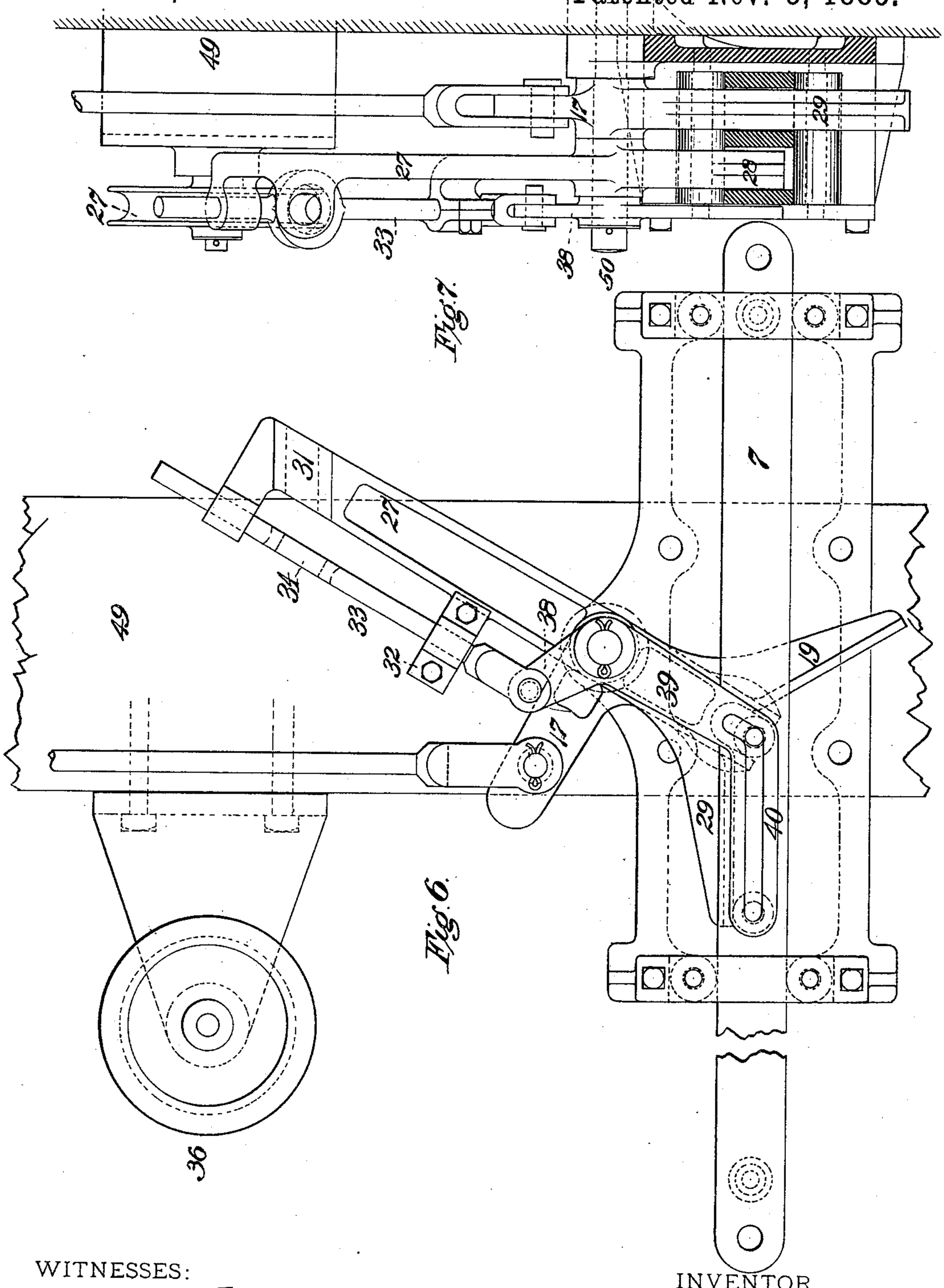


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# UNITED STATES PATENT OFFICE.

JAMES T. HAMBAY, OF ALLEGHENY, PENNSYLVANIA.

## RAILWAY SWITCH AND SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 329,643, dated November 3, 1885.

Application filed January 12, 1885. Serial No. 152,609. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES T. HAMBAY, a citizen of the United States, residing at Allegheny, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Railway Switch and Signaling Apparatus, of which improvements the following is a specification.

In the accompanying drawings, which make part of this specification, Figure 1 is a general plan view showing a switch and the switch and signal-operating mechanism adjacent thereto. Fig. 2 is a plan view, on an enlarged scale, of the switch and signal operating mechanism. Fig. 3 is a side elevation of the same. Figs. 4 and 5 are plan and edge views of the switch-operating mechanism detached from the signal-operating mechanism. Fig. 6 is a plan view, and Fig. 7 is a sectional elevation, of the signal-operating mechanism. Figs. 8 and 9 are plan and side elevation views of the detector-rail and its operating mechanism.

In the interlocking switch and signal systems now in use the switch and two or more signals are operated, each by independent levers, the final locking being effected by another lever connected to suitable mechanism for locking the switch. In operating this interlocking system, the simplest form of which consists of four levers connected as above stated, the lever connected to the distant signal is first moved to set that signal at "danger" and unlock the lever for the home signal, whose lever is then moved to set such home signal at "danger." The movement of the home-signal lever unlocks the lever of the switch-locking mechanism. This latter lever is then moved to unlock the switch, and also the switch-lever, which is now moved to throw the switch for a siding. The locking-lever is now returned to its original position, thereby locking the switch and switch-lever, the signal-levers being locked by the previous movements of the home-signal lever and the switch-lever, respectively. To close the siding, the above operation is reversed, requiring a like number of lever movements—*i. e.*, five lever movements are required to set a switch and its proper signals for a siding, and five similar movements to open the main line.

In addition to the objectionable feature of numerous lever movements incident to this system it is uncertain in its operation, as all the locking of the signals and of the levers for the switch and locking mechanism is effected at the lever-stand, while the signals and switch may be at a considerable distance therefrom, and consequently the operator cannot know whether the movements of the switch and signals have been effected; and it is possible in this system to effect the locking of the switch-lever without a corresponding movement of the signals or switch—as, for example, suppose the switch set and locked for a siding and the signals at "danger," and while the parts are in this position the connections between the switch and its lever should be broken, it is then possible for the various levers to be moved and the signals set for "safety" and all the levers locked while the switch remains set for the siding.

My present invention relates to such an improvement of the system of interlocking switch and signal apparatus in which one, two, or more switch and signal connections are operated by one operator from a single position or standpoint that the switch and signals may be operated and locked by a single movement of one lever or other device or operating mechanism, the locking of the switch and signal operating connections in their adjusted positions being effected at the switch; and it is a further characteristic of my invention that the signals which normally stand at "danger" cannot be set at "safety" until the main line is opened and the switch-rails are locked in such position; and it is an important feature of my invention that the motion necessary to set the signals is communicated thereto through the medium of the mechanism for operating the switch; hence in case of breakage of any of the switch-connections the signals cannot be moved from "danger."

To these ends my invention consists, in general terms, in the construction and combination of parts, all as more fully hereinafter described and claimed.

On the ends of the cross-ties 1 of the switch-rails 2, or on a suitable stand or frame in convenient proximity to such rails, is bolted the

frame 3, said frame consisting of a bed-plate provided with upwardly-extending corner-posts 4, the corner-posts at each end being connected by cross-pieces 5. In the bed-plate and cross-pieces inside of the corner-posts are mounted guide-rollers 6, and on the bed-plate between the guide-rollers is placed the slide 7, said slide consisting of two plates connected by bolts or rivets, on which are mounted friction-rollers, whose function will be hereinafter stated. The slide 7 is laterally supported between the ends of the bed-plate by friction-rollers 8, mounted on the bed-plate on opposite sides of the slide, as shown in Fig. 3. To the bed-plate, at one side of the slide 7, is pivoted the bell-crank lever 9, the arm 10 of said lever being connected by the rod 11 to the switch-rails in the ordinary manner, as shown in Fig. 1. The arm 12 is provided with the horns or prongs 13 and 14, the short prong 13 being a prolongation of one edge of the arm 12, and the horn 14 being arranged at an angle to the arm 12, as shown in Fig. 3, and of a length approximately equal to the length of stroke of the slide 8, and between these prongs is formed the curved recess 15, the diameter of said recess being a little greater than the diameter of friction-roller 16 between the plates of slide. The prongs 13 and 14 project between the plates, and are adapted to be engaged by the friction-roller 16 during the movement of the slide.

On the base-plate, on the side opposite the bell-crank lever 9, is pivoted the lever 17, the outer end of said lever being connected to the home signal in any suitable manner. The inner end of the lever 17 is provided with horns or prongs 18 and 19, arranged at an angle to each other and to the body of the lever, as shown, and projecting between the plates of the slide 7 are adapted to be engaged alternately by the friction-roller 20, located as above stated between the plates of the slide. The horns or prongs 18 and 19 are each made of a length slightly greater than half the length of the stroke or movement of the slide, and between, at their point of junction, is formed the curved recess 21, having a diameter at least equal to the diameter of the roller 20. On the lever 17 is formed a lug, 21, to which is connected one end of the rod 22, the opposite end of said rod being connected to a sliding bolt, 23, mounted in a boss, 24, formed on the under side of the bed-plate. Through a transverse passage in the boss 24 passes one end of the locking-bar 25, connected in the usual manner with the switch-rails 2, and provided with a slot, 26. (Shown in dotted lines in Fig. 3.) This slot 26 is so located in the bar 25 as to be in line with the bolt 23, only when the switch-rails are in position to "clear" the main line. The sliding bolt 23 should be so connected to the lever 17 that said bolt will complete its movement in locking before the lever will have moved sufficiently far to effect a change in the home signal.

To the base-plate, on the same side thereof as the lever 17, is pivoted the lever 27, having its outer end connected, as hereinafter described, to a distant signal. The inner end of this lever is provided with horns or prongs 28 and 29, similar in construction and arrangement to the horns or prongs on the bell-crank lever 9. These prongs 28 and 29 project in between the plates of the slide 7, and are adapted to be operated on by the friction-roller 30. The horn or prong 29 should be of such a length as to permit the roller 30 to pass along its face until the switch and home signal have been adjusted. Through the lever 27, near its outer end, is formed the opening 31 at an angle to the axis of the lever, and on each side of this opening, along one edge of the lever, are formed the lugs 32, adapted to serve as guides for the rod 33, through which is formed the opening 34, said opening being in the normal position of the rod in line with the opening 31 in the lever 27. Through these openings passes the chain or wire 35, one end of which is connected to the distant signal and the opposite end passes over a pulley, 36, mounted on a suitably-located post, and is connected to a weight, 37, said weight serving to hold the chain or wire at any desired tension. The lower end of the rod 33 is connected to one arm of a bell-crank lever, 38, pivoted on the pivot-pin of the lever 27. The lower arm, 39 of the bell-crank 38 is located in its normal position along the corresponding arm of the lever 27, and is provided with the prongs 40, arranged at an angle thereto, and forming a slot for the reception of the friction-roller 41, mounted on the upper plate of the slide 7. This friction-roller 41 is so located with reference to the friction-roller 30 as to operate, in the movement of the slide 7, the bell-crank lever 38, to draw in the rod 33, thereby further tightening the signal chain or wire, and to so secure the chain or wire as to cause it to move with the lever 27 when actuated by the friction-roller 30, as above stated, the weight 37 aiding the lever to set the distant signal. In case rods or pipes are employed to connect the lever 27 and the distant signal the rod 33 and its actuating bell-crank 38 may be dispensed with, the rods being attached in any suitable way to the outer end of the lever 27. Along the inner side of the rail of the main line next adjacent to the switch is placed the detector-rail 42, constructed and mounted in the usual manner, as shown in Fig. 1. The operating-arm 43 of the detector-rail is connected to the auxiliary arm 44 of the bell-crank lever 9, by the rod 45, or the arm 43 may be connected to any of the moving parts of the above-described device. On each side of the arm 43, near its upper end, are pivoted the rods 46, the free ends of said rods passing through holes in the guide-plates 47, secured to cross-ties adjacent to the operating-arm. Around these rods are placed the springs 48, which are alternately compressed as the arm 43 is turned to the right or to the

left. The tension of the compressed spring will aid in moving the operating-arm and the detector-rail, thus relieving the slide of part of its load.

In lieu of arranging the signal-operating levers 17 and 27 and the switch-lever 9 on a common stand, they may be separated a considerable distance, the switch-lever being located at the switch and the signal-levers arranged in close proximity to or on the home-signal post. Such an arrangement of the device is clearly shown in Figs. 4 and 5. That portion of the bed-plate on which the switch-lever 9 is mounted is secured to the cross-ties adjacent to the switch-rails.

The construction and operation of the slide and lever 9 are similar to those above described; but in lieu of actuating the locking-bolt from the home-signal lever, I provide two such locking-bolts, which are secured to the slide 7 on opposite sides of the locking-bar, said bar in this instance being provided with two slots suitably located for locking the switch in open and closed positions.

The portion of the bed-plate on which the signal-operating levers 17 and 27 and the compensator-lever 38 are mounted is secured to the post 49 of the home signal, and in lieu of pivoting said levers at different points along the bed-plate, I in this arrangement prefer to mount them on a common pivot, 50. This arrangement of the levers necessitates a similar arrangement of the friction-rollers 20, 30, and 41—*i.e.*, in different planes. Therefore the slide 7 is composed of three in place of two plates. These friction-rollers are arranged along the slide 7 in such relation to each other and the levers operated thereby that the same sequence and continuity of action is effected as in the case when all the levers are pivoted to a common bed-plate. The two sections of the slide 7—*i.e.*, that employed for operating the switch-lever and the section for operating the signal-levers—are rigidly connected by a rod or pipe, so as to effect a simultaneous movement of both plates. The slide 7 is connected by rods or pipes to a lever or other suitable operating mechanism located at the switch or at any other desired point.

If desired, the arrangement of slide and levers shown in Figs. 6 and 7 may be employed for operating the switch-rails and a signal at a distance therefrom, the switch-rails being connected to the lever 17 and the signal to the lever 27, as will be easily understood.

In describing the operation of my apparatus I will assume that the switch is open and that both signals are at "danger," and that it is desired to clear the main line. It will be observed, however, that in the arrangement of the apparatus shown in Figs. 1 to 3 the switch-rails are locked only when in position for clearing the main line, but that in the apparatus shown in Figs. 4 and 5, the switch is locked in both of its positions. The reason for this difference of construction will appear further on. As the slide 7 is moved in the direction indicated by arrows in the several views, the friction-roller 16 leaves the horn 13 of the bell-crank 9, and striking against the horn 14 causes it to assume a position parallel with the slide 7. This movement of the horn 14 effects a corresponding movement in the arm 10, thereby shifting the switch-rails to which said arm is connected and causing the locking-bar to move along its guide-passage until the slot 26 is in line with the path of the bolt 23. During the above movements the friction-roller 20 is moved along the horn 18 from the position shown in Fig. 3 to the recess 21, and during this travel of the roller 20 the lever 17 is held stationary by the roller and the stop 51. As the slide continues its movement, the roller 20, striking the horn 19, swings said horn into a position parallel with the line of movement of the roller, thereby shifting the lever 17 and setting the home signal at "safety." This movement of the lever 17 causes the bolt 23 to enter the slot in the locking-bar 25, thereby locking the switch-rails in line with the main rails. As the bolt 23 is so located and so connected to the lever 17 that it will enter the slot in the locking-bar during the first part of the movement of said lever 17, it will be observed that any movement of the lever will be prevented by the bolt striking against the unslotted portions of the locking-bar, unless the switch-rails have been moved sufficiently far to bring the slot in the locking-bar in line with the bolt, consequently the home signal cannot be shifted from its "danger" position until the switch is properly adjusted. During the above movements of switch and home-signal levers 9 and 17 the friction-roller 41 moves along the slot formed by the prongs 40 of the lever 38, and striking the end of said slot shifts the lever, thereby securing the wire or chain 35 to the lever 27, this operation being finished just as the home signal is set at "safety." As soon as the home signal is set and the chain 35 has been secured, the roller 30, which during the previous movements of the apparatus has been moving along the horn 29 of the lever 27, strikes against the horn 28 and shifts the lever 27 so as to set the distant signal at "safety" while the slide is completing its stroke or movement.

It will be observed that it is a prominent characteristic of my apparatus that none of the signals can be set at "safety" until the switch is properly adjusted, for if the home signal cannot be set, as above stated, any further movement of the slide 7 is prevented, the roller 20 being stopped by the horn 19, consequently the distant signal cannot be set, as its lever is operated while the roller 20 is moving along the horn 19 from the recess 21. In opening the switch the above operations are reversed. The distant signal is set at "danger," then the home signal is correspondingly adjusted, and as its lever is moved to set the signal the bolt 20 is withdrawn from the locking-bar, and finally the switch-rails are moved to open the

switch. During the movements for setting the switch the detector-rail is moved from the position shown in full lines to that represented by dotted lines in Fig. 1, and in this shifting of position said rail is raised above the main rails; hence if a car or train is standing on the rails adjacent to the switch any change of the switch-rails is prevented.

In lieu of connecting the rod 45 for operating the detector-rail to an auxiliary arm of switch-lever 9, it may be connected to the slide 7 or any other moving part of the apparatus.

In lieu of connecting the locking-bolt to the home-signal lever, as shown in Figs. 1 to 3, it may be connected to the slide 7, or may be formed thereon, as shown in Fig. 4; and, if desired, two locking-bolts for securing the switch-rails in both positions may be employed. Such duplication of locking devices is not generally necessary in trailing switches, but should be used in facing or derailing switches.

In case it is desired to lock the switch-rails in both positions, when the arrangement shown in Figs. 1 to 3 is employed, a locking-bolt can be arranged opposite the bolt 23, and so connected to the slide, as shown in Fig. 4. When two bolts are employed, two slots should be formed in the locking-bar 25, such slots being separated a distance equal to the throw of the switch-rails.

I claim herein as my invention—

1. In a switch and signal actuating mechanism, a slide having thereon devices for successively engaging suitable mechanisms for shifting the switch and signals, said devices being suitably arranged to operate the switch and signals by a continuous movement, and in combination with such switch and signal shifting mechanisms, substantially as set forth.

2. In a switch and signal actuating mechanism, a slide having thereon devices for successively engaging suitable mechanisms for shifting the switch and signals, said devices being suitably arranged to operate the switch and signals independently, in combination with such switch and signal shifting mechanisms, substantially as set forth.

3. In a switch and signal actuating mechanism, a slide having thereon devices for engaging suitable mechanism for shifting the switch and signals, said devices being suitably arranged to operate the switch and signals in succession and by a continuous movement, in combination with such switch and signal mechanism and a bolt operated by the slide for locking the switch-rails, substantially as set forth.

4. In a switch and signal actuating mechanism, a slide having thereon a series of friction-rollers, in combination with a series of levers for shifting the switch and signals adapted to be operated in succession during the continuous movement of the slide, substantially as set forth.

5. The combination of a slide, a switch-shifting lever engaged and operated thereby in the first part of its movement, a switch-locking bar, a locking-bolt also taking its motion from the slide and arranged to lock the switch immediately on its being shifted, and a signal-shifting lever engaged by the slide at or toward the latter end of its stroke, whereby to shift a signal at or after the locking of the switch is effected, substantially as set forth.

6. A sliding bar, 7, a wrist or friction-roller, 16, thereon, and a switch-shifting lever, 9, having an arm, 14, suitably arranged and proportioned, whereby after the switch is shifted it will be retained or locked in its new position by the wrist or roller 16 engaging the arm 14, in combination with signal-shifting mechanism and one or more devices moving with the slide and successively engaging such signal-shifting mechanism while the wrist or roller is moving along and in engagement with the arm 14, substantially as set forth.

7. In a switch and signal actuating mechanism, a slide having thereon a series of friction-rollers, in combination with the switch and signal shifting levers 9 and 17, the locking-bar 25, provided with one or more slots, and one or more bolts, 23, actuated by or from the slide, substantially as set forth.

8. The slide 7, having thereon the rollers 30 and 41, in combination with the lever 27, having the opening 31 in its outer end, the rod 33, having a corresponding opening, 34, and the lever 38, connected to said rod, substantially as set forth.

9. In a switch and signal actuating mechanism, a slide having thereon a series of friction-rollers, in combination with a series of levers connected, respectively, to the switch-rails, and the home and distant signals, said rollers being so arranged on the slide as to operate the levers in succession during the continuous movement of the slide, and the levers being so constructed that during the operation of any one lever the other levers are held stationary, substantially as set forth.

10. In a switch and signal actuating mechanism, a slide having thereon a series of friction-rollers, in combination with the levers 9, 17, and 27, connected, respectively, to the switch-rails, and the home and distant signals, said levers being provided with horns or prongs for engagement with the rollers, one of the horns on the lever 9 being of such a length as to engage the roller 16 during approximately the entire movement of the slide, the horns of the lever 17 having each a length approximately equal to half the movement of the slide, and the lever 27 being constructed similar to the lever 9, but oppositely arranged, substantially as set forth.

11. In a switch and signal actuating mechanism, a slide having thereon a series of friction-rollers, in combination with a series of levers for shifting the switch and signals, and a detector-rail connected to a moving part of the actuating mechanism, substantially as set forth.

12. The slide 7 and wrist or frictional rollers 20 and 30 thereon, in combination with levers 17 and 27, having arms suitably arranged and proportioned, whereby the lever 27 is locked during the movement of the lever 17, which in turn is locked in its new position during the shifting of the lever 27, substantially as set forth.

13. In a switch and signal actuating mechanism, a swinging detector-rail, in combination with the operating-lever 43 and the relieving-springs 48, arranged on opposite sides of the lever 43 and adapted to assist in swinging the detector, substantially as set forth.

In testimony whereof I have hereunto set my hand.

JAMES T. HAMBAY.

Witnesses:
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