

(No Model.)

3 Sheets—Sheet 1.

J. DONOVAN.
RAILROAD SWITCH.

No. 369,633.

Patented Sept. 6, 1887.

Fig. 4.

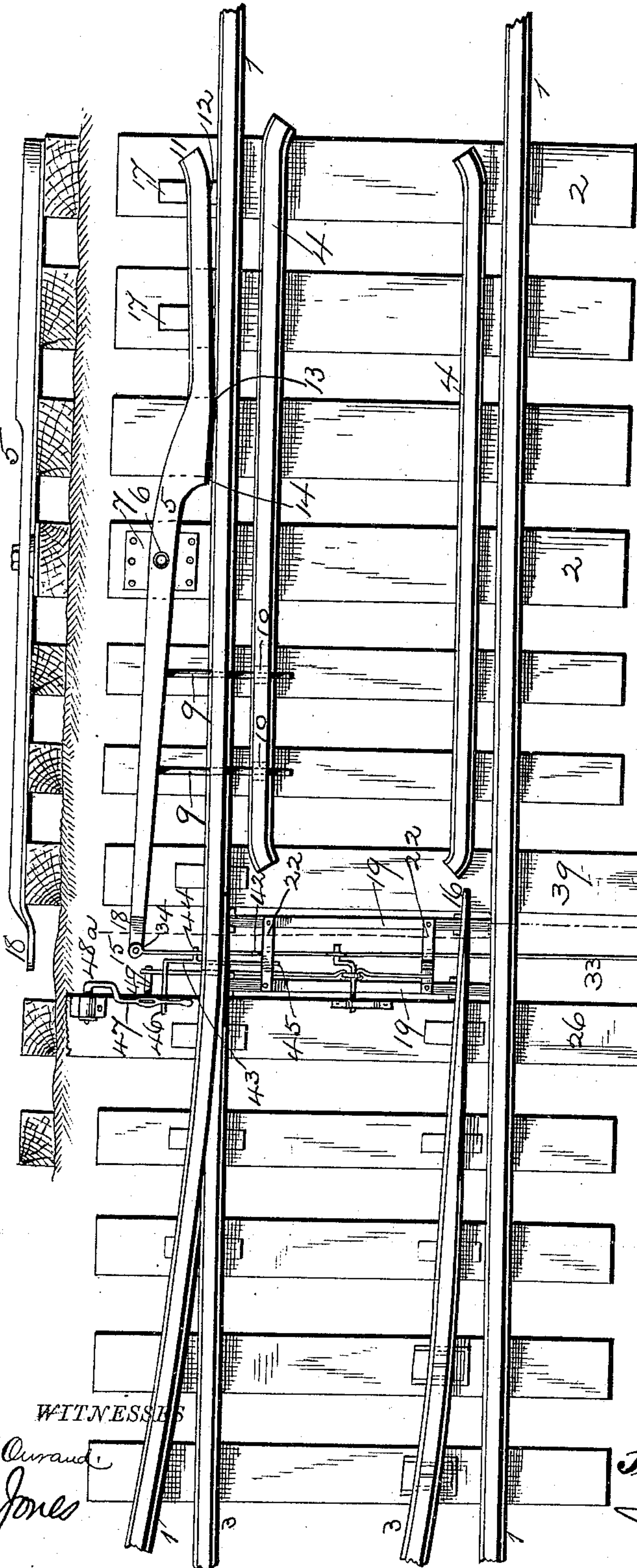
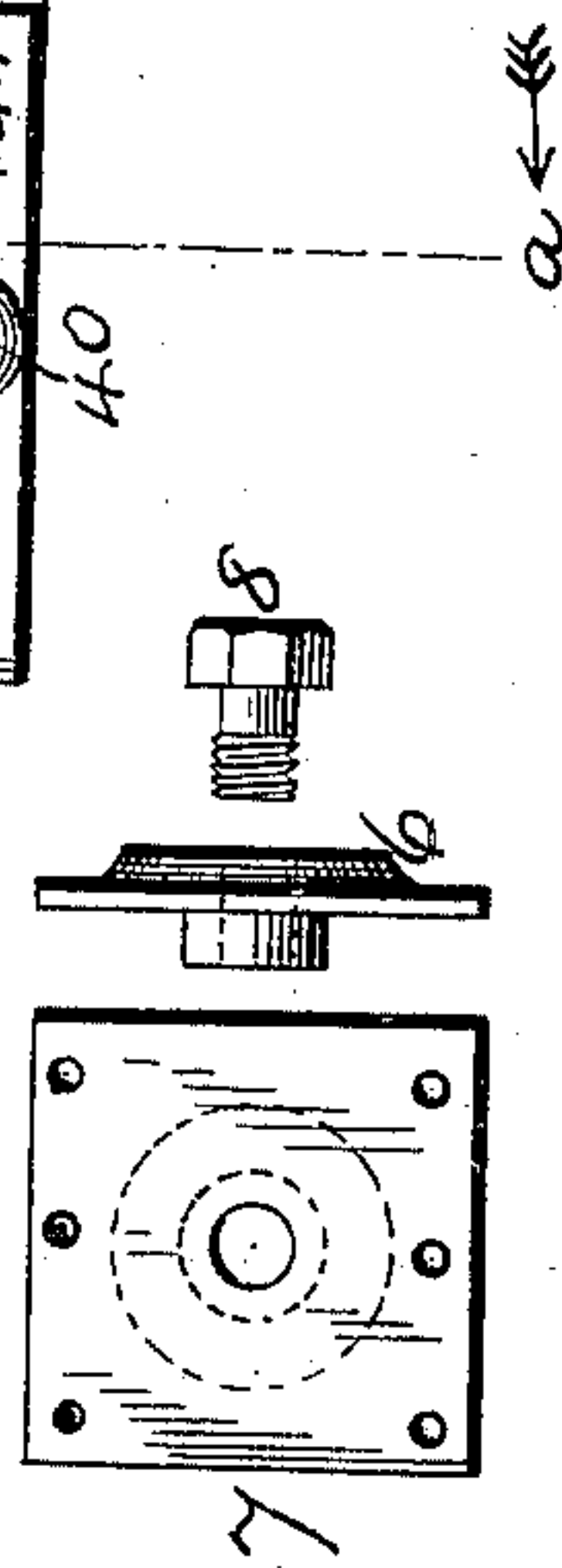


Fig. 1.

Fig. 5.



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(No Model.)

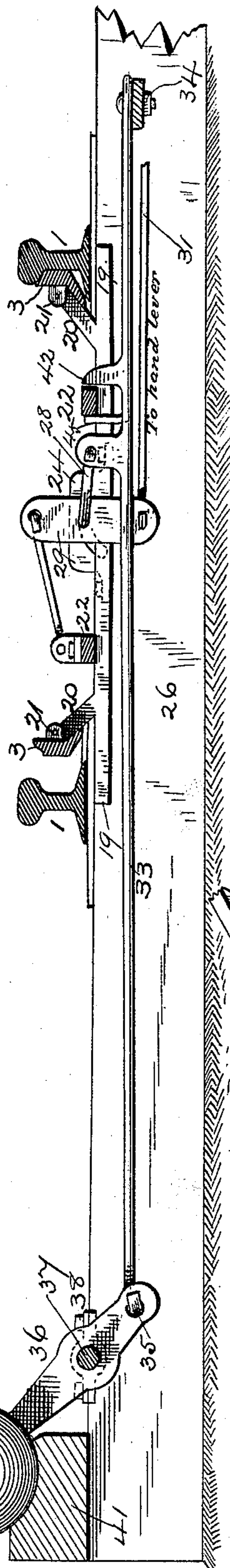
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Fig. 2.



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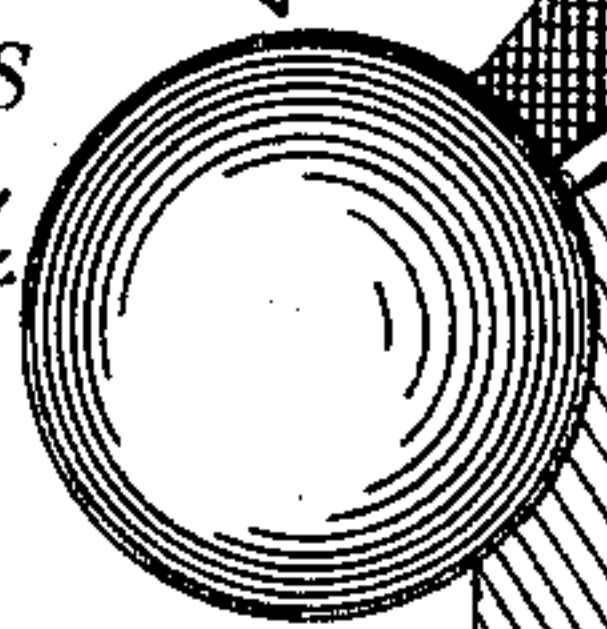
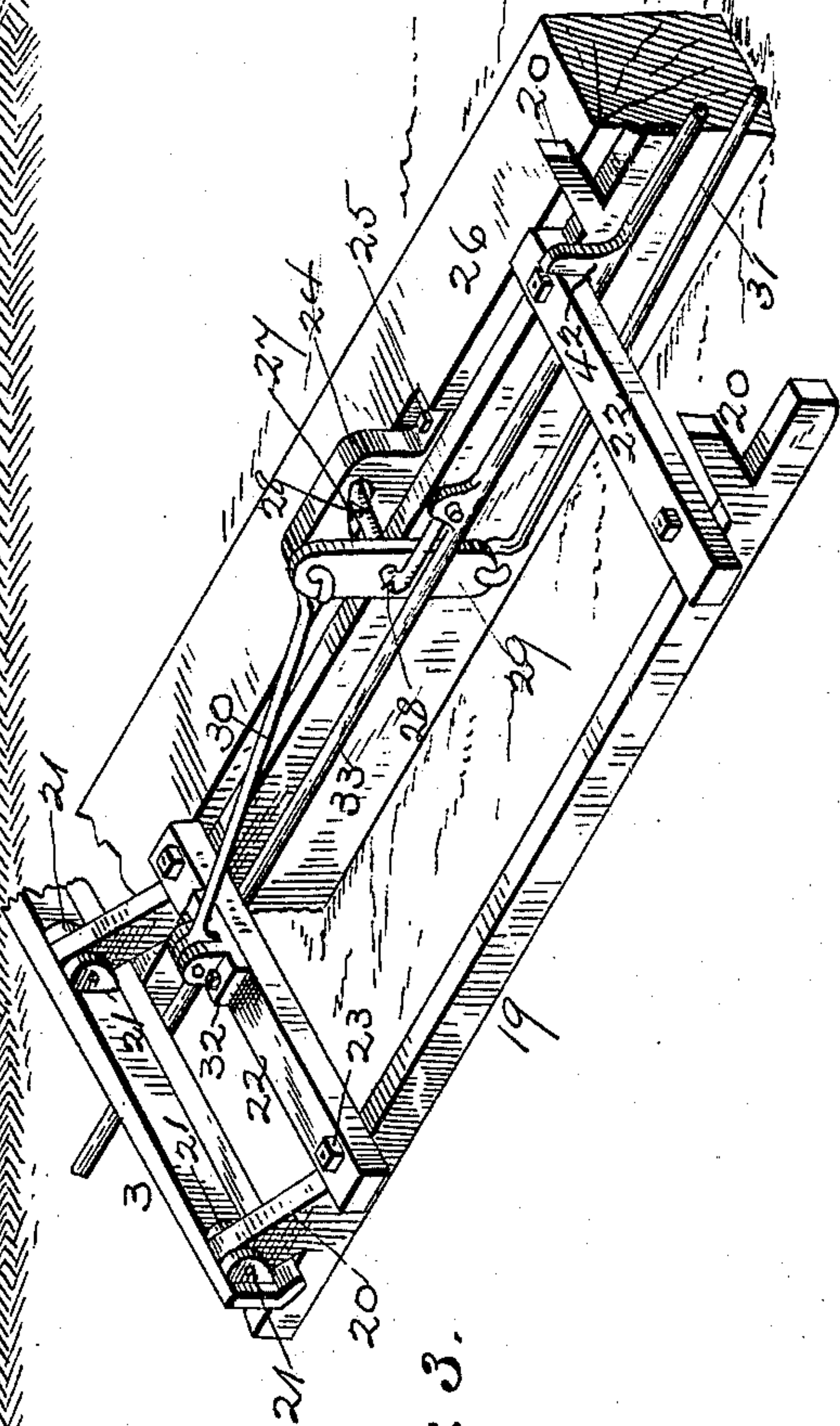


Fig. 3.



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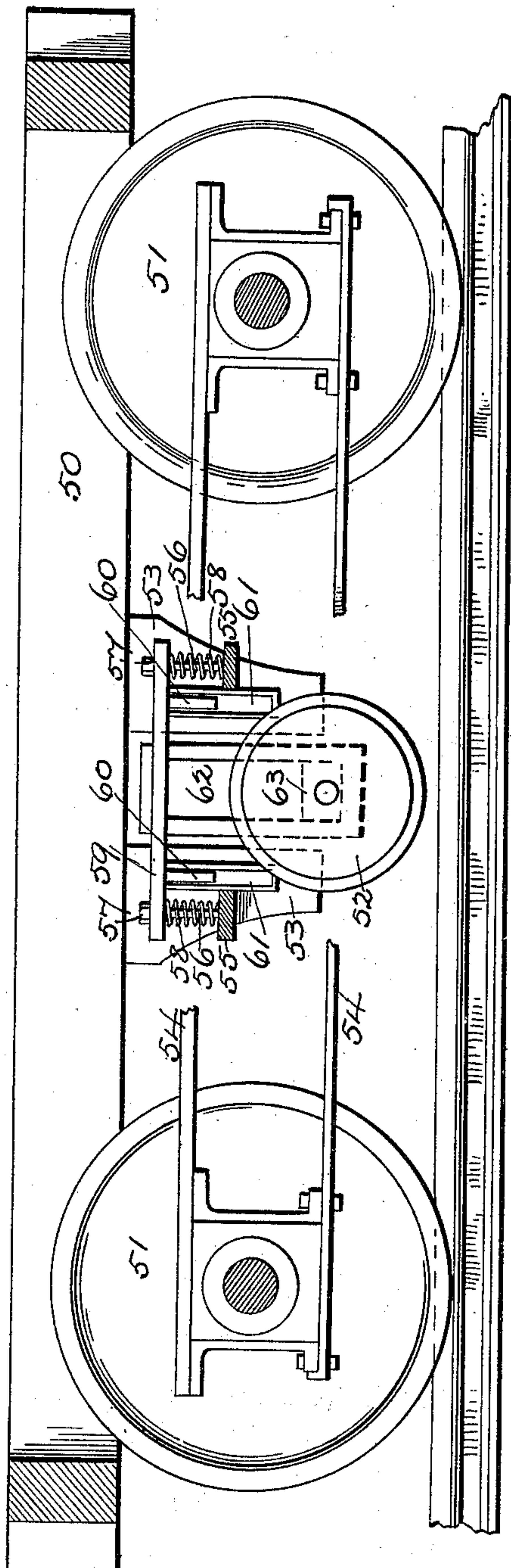
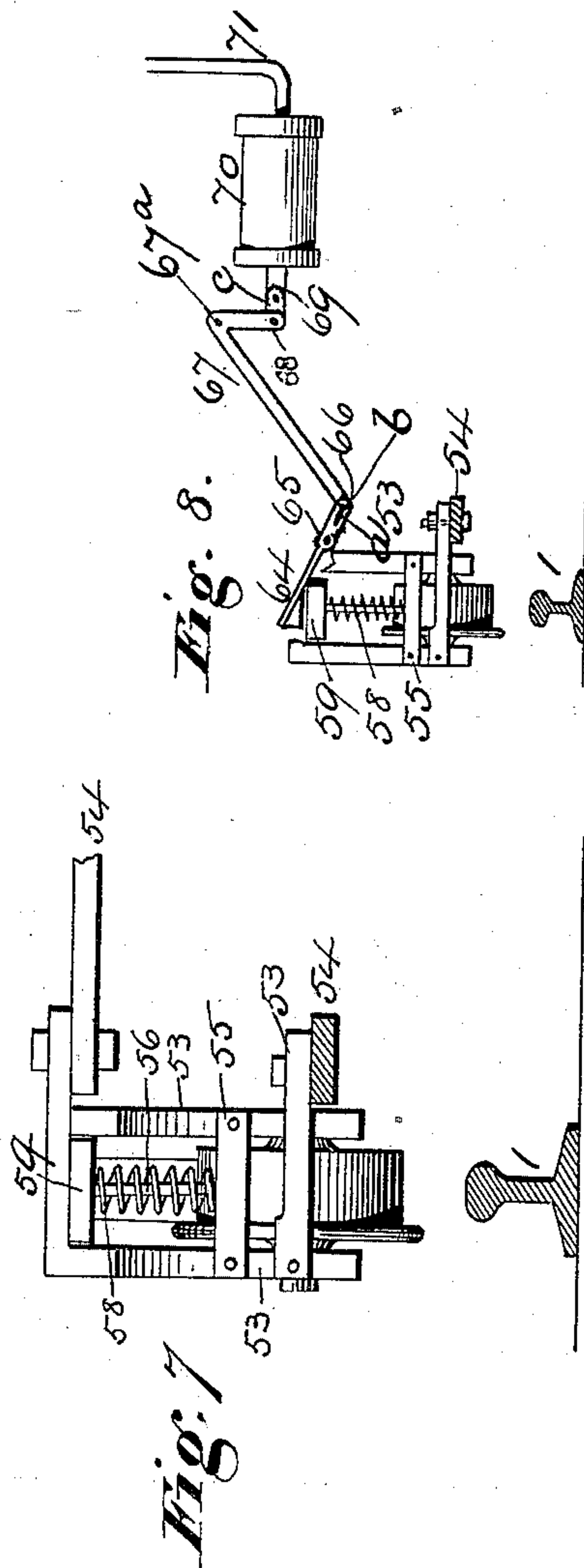
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3 Sheets—Sheet 3.

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UNITED STATES PATENT OFFICE.

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RAILROAD-SWITCH.

SPECIFICATION forming part of Letters Patent No. 369,633, dated September 6, 1887.

Application filed November 12, 1886. Serial No. 218,715. (No model.)

To all whom it may concern:

Be it known that I, JEREMIAH DONOVAN, a citizen of the United States, residing at Carlisle, in the county of Cumberland and State of Pennsylvania, have invented certain new and useful Improvements in Railroad-Switches; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to automatic railroad-switches.

The invention comprises switch-rail connections, reciprocating devices connecting the same and the switch-operating lever, a switch-operating lever connected to the switch-rails through intervening rods and connections, devices for securing the automatic restoration of the switch-rails to their normal position upon the operative lever being thrown outward, a wheel suspended with capability of vertical reciprocation from the truck, and suitable devices for reciprocating said wheel so as to bring it into operative contact with the switch-operating lever, and also raise said wheel therefrom, as desired, all as hereinafter described.

In the accompanying drawings, Figure 1 represents a top plan view of a portion of track and siding with my improved switch-connections in position. Fig. 2 represents a cross-section taken on the line *a a* of Fig. 1. Fig. 3 represents a detail perspective view of a portion of the switch-rails and their connective operating devices. Fig. 4 represents, in side elevation, the switch-operating pivotal lever on cross-ties. Fig. 5 represents a detail view of the pivotal connection of said lever. Fig. 6 represents a medial longitudinal section of a portion of a locomotive-truck having my vertically-reciprocating switch-operating wheel in position thereon, but out of operation. Fig. 7 represents a detail end view showing the switch-operating wheel, its hangers, sliding frame, and one means for securing the automatic retraction of said wheel after operation. Fig. 8 represents a similar view in connection with means for operating said wheel.

1 represents the main-line rails; 2, the cross-ties; 3, the switch-rails, and 4 the guard-rails.

5 represents a lever of suitable shape, which lies on the outside of the main line and rests upon and is pivoted on a flanged collar, 6, which rests upon a plate, 7, secured to a cross-tie, said pivot 6 being held to the plate 7 with capability of free rotary movement thereon by the screw-bolt 8. (Shown in detail in Fig. 5 of the drawings.)

9 9 represent rods attached at one end to the pivoted lever and extending inward therefrom beneath the main and guide rails, said rods sliding as the pivotal lever is moved in suitable grooves or ways, 10, so as to steady said lever in its movements, and also hold said lever and its connections rigid, the weight of the superposed truck pressing the rail on said rods. The rear of the pivotal lever 5 extends outwardly in the form of a curve, as shown, so as to prevent the operating-wheel, to be presently described, striking the extreme end of said lever.

The space between the outer face of the main rail and the inner face of the pivotal lever, at the rear part, 12, thereof, is of a width to receive the flange of the lever-operating wheel, and from thence to the point 13 the space between said lever and rail decreases, so that as said wheel travels along the track it will continuously act to press said lever outward. From the point 13 to the point 14 the lever is enlarged or widened inwardly, so as to cause it to press snugly against the rail until the flange of the lever-operating wheel reaches the (or near the) point 13. By the time said wheel has reached the point 13 that portion of the lever rearward of the pivot 6 has been thrown to its farthest point and the front end, 15, of said lever has been forced inward to, by means of its connections therewith, open the points 16 and operate the switch. When the lever has thus reached its limit of movement, that part thereof between the points 13 14 will be just far enough apart from the main rail to permit of the entrance and passage of the flange on said wheel. By thus inwardly extending the inner face of the lever the operating-wheel is permitted to travel in contact with said lever for a suitable distance after

the switch is thrown, and consequently holding said lever and switch in their operative positions. Inasmuch as the distance between the trucks and the wheels on some cars is greater than on others, this arrangement for insuring the travel of the lever-operating wheel in contact with said lever, and the consequent holding of said lever and switch in position, is a very material one, as these parts are thus held in their thrown positions until the locomotive or car, whatever the distance between the trucks may be, has reached and is running upon the switch. Where the distance between the trucks is long, without the before-described arrangement for insuring the retention of the operating-wheel in contact with the lever until the forward truck has reached the switch-rails, said wheel might pass beyond and out of contact with the lever before the front wheels of the coach had reached the switch, in which case the lever would be apt to swing back and disarrange the points; but by my arrangement such a disastrous result is entirely avoided and the switch and its operating-lever securely held until the switch is reached and a part of the car actually thereon.

17 represents metal plates, upon which the lever slides in its reciprocal movements.

The front end of the lever 5 is depressed, as shown at 18, so as to facilitate the connection therewith, beneath the track, of the switch-connections.

19 19 represent the bridges or bars connecting the switch-rails together. These bars have near their respective ends upwardly-extending lugs or arms 20, which are bolted between ears 21 on the inner faces of the switch-rails 3, as clearly represented in Fig. 3, their extreme ends extending beneath the rails, as shown.

22 22 represent transverse cross-bars, bolted to and connecting and bracing the bridge-bars 19 together, as shown at 23.

24 represents an upwardly-extending plate bolted within a recess, 25, in or on the top of the cross-tie 26, and having an elongated curved transverse slot, 27, within which one end of a crank rod or shaft, 28, works.

29 represents a rocking plate or bar having a hole at its center, through which is passed the opposite end of the crank-rod 28, and near each end other holes, with which engage the hooked ends of levers or rods 30 31. The rod 30 has pivotal bearing in an eared plate, 32, bolted to one of the transverse cross-bars 22, its office being to hold said rocking plate 29 in vertical position when not thrown down, while also permitting, by reason of its pivotal bearing in the box or plate 32, of the free movement of said plate when rocked by the lever connected thereto. The rod 31 extends from said rocking plate 29 and connects with a hand-lever, which is employed when it is desired to operate the switch by hand.

33 represents a rod which extends transversely across the way and beneath the rails, one end being connected in any suitable manner at 34 to the front end of the lever 5, and

from thence passing to and hooked in the lower end, 35, of a lever, 36, which extends below the track, and is mounted on a pivotal shaft, 37, journaled in bearings 38 on the cross-ties 26 and 39. This lever has at its upper end a ball or weight, 40, which in its normal position—that is, when the switch is closed—rests upon a recessed pillow-block, 41, on the ties 26 39, or in any other suitable position.

42 represents an upwardly-extending lug or ear on the rod 33, which, when the switch is in the position indicated in Figs. 1 and 2, abuts against the adjacent cross-bar 22. When the pivotal lever is operated to push the front end thereof inward, it pushes the lever 33 inwardly across the way, and as said lever so moves inward the lug or ear 42 thereon pushes against the cross-bar 22, adjacent thereto, slides the bridge-bars 19 connected thereto, and the switch-rails into their appropriate positions to switch the train, and rocks the lever 36 on its fulcrum 37, so as to bring said lever 36 and its weight to an upright position. When the entire train has passed over the switch and the pressure of the train thereon removed, the weight will drop down onto its pillow-block 41, and thereby push back the rod 33 and parts connected therewith, and as said rod resumes its normal position, as shown in Fig. 1, it will, by means of a right-angled rod or lever, 43, which is pivotally connected by a stud or pin, 44, to said rod 33, and by a hook-shaped or up-turned end, 45, with one of the cross-bars 22, draw back the bridge-bars 19 and the thereto-connected switch-rails, and will also return the rear end of the lever 5 to a position adjacent to the main-line rail in readiness for being again operated upon by the wheel on the locomotive or car. The right-angled outer end, 46, is ordinarily held down by the hand-lever 47, which prevents it from rising, but yet permits of its sliding horizontally. This lever or rod 43, as will be observed on reference to Fig. 1 of the drawings, is of greater length inwardly of its pivot 44 than is that portion outwardly of said pivot. Consequently when said hand-lever is raised to operate the switch by hand the inner end of said lever or rod 43 will turn on its pivot 44 and drop down between the ties, and thus disconnect the rod 33 from the bridge-bars and switch-rails.

When it is desired to operate the switch by hand, the switchman unlocks the hand-lever 47, raises and turns it on its crank 48, and by means of the short connecting-rod 49, attached to the rod 31, draws said rod 31 upward and outward, and as said rod so moves outward it rocks the rocking plate 29 upon the crank-rod 28, and causes said plate to push the rod 30 and the thereto-connected cross-bar 22 and bridge-bars 19, and thus slides the switch-rails connected to said bridge-bars.

I will now proceed to describe the method and apparatus illustrated by me for securing the automatic operation of my switch from an engine or car.

In Fig. 6 of the drawings, 50 represents the

forward truck of a locomotive, 51 the truck-wheels, and 52 the switch-actuating wheel heretofore referred to. 53 represents a suitable frame-work secured to or suspended from the truck-frame 50, or bolted to the bars or rods 54. Secured to said frame are bars 55, which serve as supports for upwardly-extending rods 56, which are screw-threaded at their upper ends to receive nuts 57, and are each encircled by a spiral spring, 58. 59 represents a bar, which at or near each end is formed with a vertical hole, through which the upper ends of said spring-encircled rods 56 pass, said bar resting upon and being supported by the springs 58, as represented in Figs. 6, 7, and 8 of the drawings, and having depending lugs or flanges, which enter the guideways 61 in the framing 53, so as to guide the bar 59 in its vertical reciprocatory movements. 62 represents the hangers, which are secured to the bar 59, and within which is the journal-box 63 of the wheel 52. The springs 58 serve to return the bar 59, the hanger 62, and the wheel 52 to their highest positions, so as to raise said wheel from the rail upon the downward pressure upon said wheel being released.

In Fig. 8 of the drawings I have represented a convenient method of securing the projection downward of said wheel onto the main rail and in contact with the switch-operating pivotal lever 5, heretofore referred to. In this illustration, 64 represents a short arm or lever adapted at its outer end to engage with the bar 59, and having a rocking bearing at 65 in any suitable support, the rear end of said lever or arm 64 being slotted, as shown at *a*, and connected at 66 to an angular lever, 67, by means of a pin, *b*, on said lever 67, engaging the slot *a*. This angular lever 67 is fulcrumed at 67^a in a suitable support, and is connected at 68, by means of a link, *c*, to the piston 69 of an air or steam cylinder, 70. 71 represents a pipe, through which compressed air or steam may be forced by the engineer into the piston-cylinder 70, so as to force the piston-rod 69 outward therefrom. In the arrangement shown in Fig. 8, as the piston is projected it will rock the angular lever 67 on its fulcrum, the link *c* forming a jointed connection between the piston and the short end of the lever 67, so as to admit of the arc movement of said lever, and the longer end or arm of said lever 67, in connection with the short arm or lever 64, will at the same time, by reason of its pin-connection *b* with the slot *a* in the arm 64, move in an arc and raise the slotted lower end of said arm 64 and rock the same on its pivot 65, and depress the free end thereof upon and force down the bar 59 and the sliding frame 53 and the wheel 52, connected thereto, and thus bring said wheel 52 upon the main rail, with its flange between said main rail and the switch operating lever 5, pivoted to the cross-ties. When this wheel has traveled the distance heretofore mentioned to insure the opening of the switch and the entrance of the train thereon, the sup-

ply of compressed air or steam is discontinued and exhausted from the cylinder 70, whereupon the piston recedes, draws back the lever 67, and raises the lever 64 from the bar 59, and permits of the springs 58 resuming their normal position and raising the sliding hangers and lifting the wheel 52 from the rail. In the drawings I have shown only one mode whereby the vertical reciprocation of the switch-operating wheel and its supporting-frame may be obtained. It is manifest that this result may be accomplished in a variety of ways without departing from my invention. For instance, the devices supporting the wheel may be reciprocated, so as to bring the wheel onto the rail and raise it therefrom by a lever, a screw-rod, a wedge, or any other suitable device capable of securing the vertical reciprocation of said wheel and its supports.

By connecting the rods 9 to the pivotal lever 5 and extending them beneath the main rail, as shown in Fig. 1 of the drawings, the forward wheel of the first truck on reaching that part of the main rail immediately above said rod or rods 9 will, by reason of the weight of the truck, cause said rail to press down upon and grip said rods, and thereby hold them and the thereto-connected pivotal lever and switch rigidly in their thrown position. By the time the operating-wheel 52 has reached the widened portion of the lever 5 the front wheels of the forward truck will have reached the switch, and will exert such a weight thereon as will prevent its movement. The wheels of the following trucks will, as they pass along that portion of the main rail 1 above and adjacent to the rods 9, similarly act to hold said rods and their connections down. Thus, however great the distance may be between the truck-wheels of a car, there will always be a pair of such wheels either pressing down upon the main rail and the rods 9 thereunder, or else upon the switch-rails, thus insuring the secure holding of the switch until the wheels of the last truck have passed off the switch. As the trucks of Pullman coaches are some forty-six feet apart, it will readily be seen that this arrangement of devices will insure the maintenance of the switch in its thrown position even while they are passing. This lengthening of the switch-holding mechanism is quite important, as thereby my switch is adapted for use in all cases, and secures the certain locking of the switch in position in all cases during the passage of a train.

Having thus described my invention, what I claim is—

1. In a railroad-switch, the combination, with a bridge or frame connected to the switch-rails, of a rod adapted to engage said bridge or frame, a rocking plate having crank bearing and connecting said rod and switch-frame, and a lever connected with said rod and adapted on its reciprocation to throw the switch in either direction.

2. In a railroad-switch, the combination, with the switch-rails and a connecting bridge

or frame, of a pivotal switch-operating lever, a rod connecting said operating-lever and switch-frame, a slotted plate secured to a cross-tie, a rocking plate, and a crank-arm having bearing within the slotted plate and connecting the rocking plate therewith, so as to support the lever-rod and secure its free-guided movement when the switch-operating lever is actuated.

3. In a railroad-switch, the combination, with the switch-rails and their connecting frame or bridge, of a rod, devices thereon or connected thereto to engage said switch-frame and reciprocate the same in corresponding directions to the movement of said rod, a rocking plate connected at its upper end to said switch-frame, a crank connecting said rod and rocking plate, an elongated slotted plate to receive one end of said crank, a pivoted switch-operating lever connected at one end to said rod, and a wheel suspended from a truck or locomotive to rock said pivoted lever and throw the switch, substantially as set forth.

4. The combination, with a switch, of a vertically-pivoted lever adapted to rock in a horizontal plane, devices connecting said lever and switch, and a wheel on a locomotive or car truck to engage and force horizontally outward the rear end of said pivoted lever, the front portion of said lever being of a width to insure the inner face thereof remaining in sufficiently close proximity to the main rail when said lever and switch are fully thrown to act as a guide for the flange of the lever-operating wheel and permit of said flange holding the pivoted lever and switch open until the locomotive or car reaches the switch.

5. In a railroad-switch, the combination of a pivoted switch-lever, a rod connected thereto and to the switch, and a lever journaled upon the cross-ties and having a downwardly-projecting end, to which the rod is connected, and a weighted upper end, for the purpose of securing the throw of the switch when said piv-

oted lever is operated, and also securing the automatic closing of the switch at the proper time, substantially as set forth.

6. In a railroad-switch, the combination, with the switch-rails, of a rod connected thereto, a lever connected at one end to said rod and pivotally mounted on a tie or support outside of the main rail, and having a rearwardly-extending end, a wheel supported on a locomotive or car truck with capability of vertical reciprocation, means for reciprocating said wheel so as to bring it in operative contact with the rear portion of said pivoted lever, and also automatically raise said wheel therefrom, and one or more rods connected at one end to said pivoted lever and extending therefrom inwardly beneath the main rail adjacent to said lever and in contact with the under face of the flange thereof, in order that the weight of the wheels of the passing train shall press the rail down upon said rod or rods and thereby hold the same and the thereto-connected lever and switch rigid until the train has entirely passed over said rail onto the siding.

7. The combination, with a pivotal lever and devices, as described, for actuating the same, of a rod connected at one end to said pivotal lever and adapted to abut against the switch-connections, a weighted lever connected to the opposite end of said rod, and having pivotal bearing on a tie, and a rod or lever pivotally connected to said weighted rod and adapted to engage with the switch-connections, whereby upon the train passing off of the siding said rod connecting the pivotal lever and switch will automatically restore the switch and its connections to their normal positions, substantially as set forth.

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

JEREMIAH DONOVAN.

Witnesses:

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