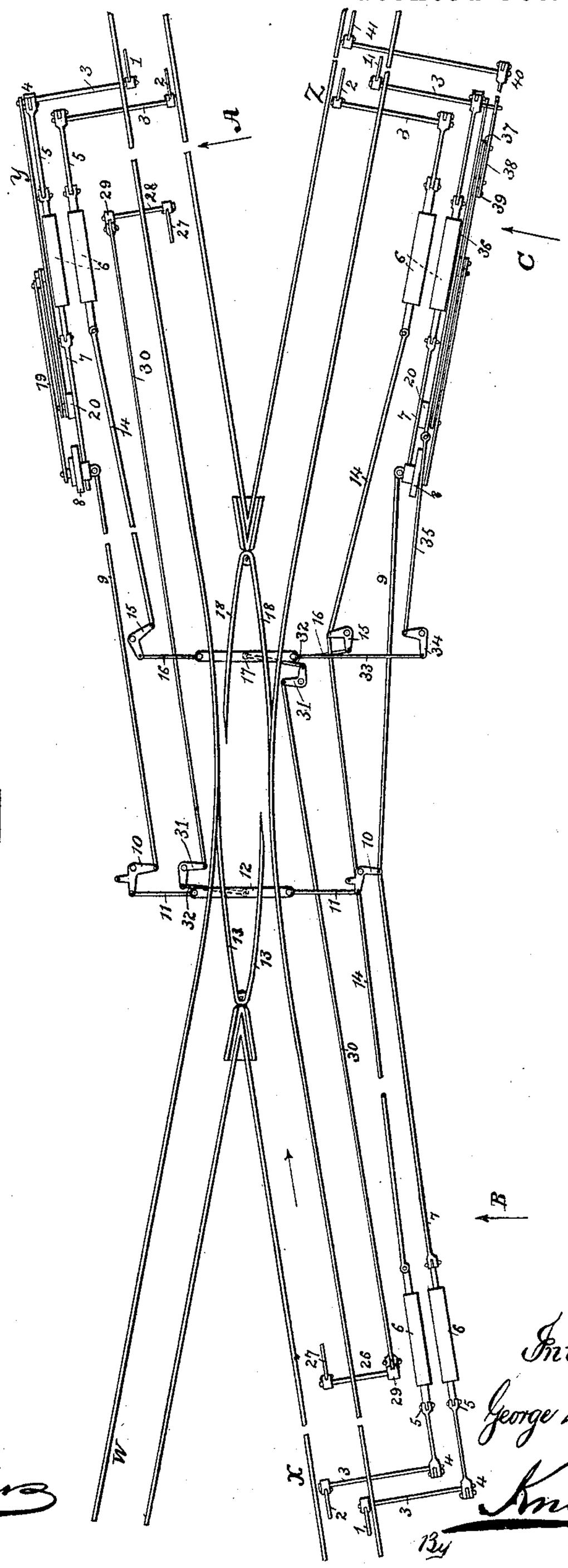
(No Model.) 3 Sheets—Sheet 1.

G. W. VOORHEES.

AUTOMATIC RAILWAY SWITCH.

No. 390,999. Patented Oct. 9, 1888.

Fig. 1.



Attest:
Geo. T. Smallwood.
F. A. Hopkins

Inventor:
George W. Voorhees.
Knight Bros.
Attys

(No Model.) 3 Sheets—Sheet 2.

G. W. VOORHEES.

AUTOMATIC RAILWAY SWITCH.

No. 390,999. Patented Oct. 9, 1888.

Fig. 2.

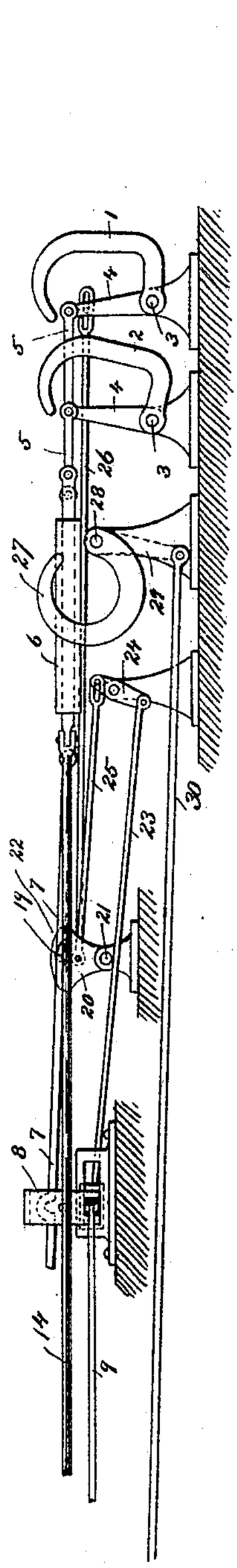


Fig. 3.

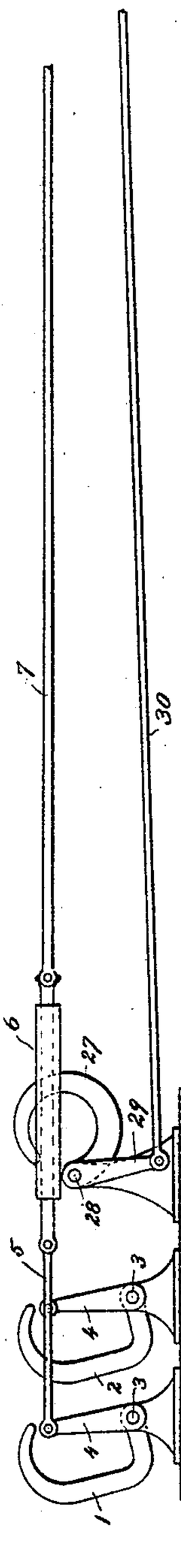
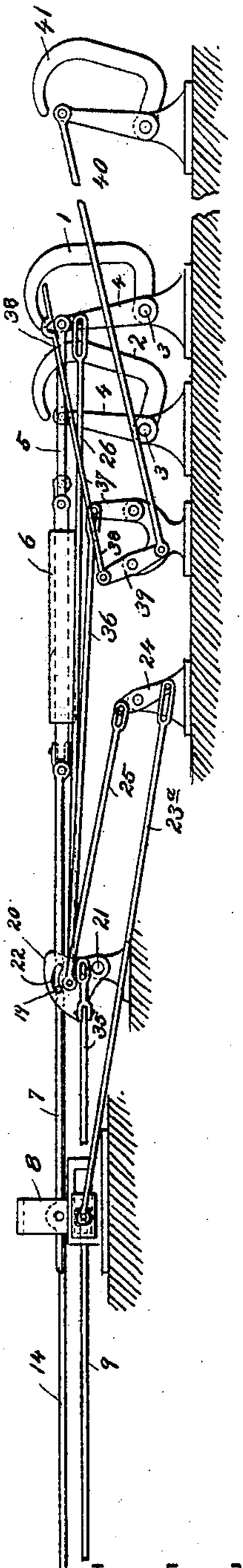


Fig. 4.



Witnesses.
John F. Nelson.
Lillie Hanna.

Inventor.
George W. Voorhees,
By Knight Bros
Attorneys.

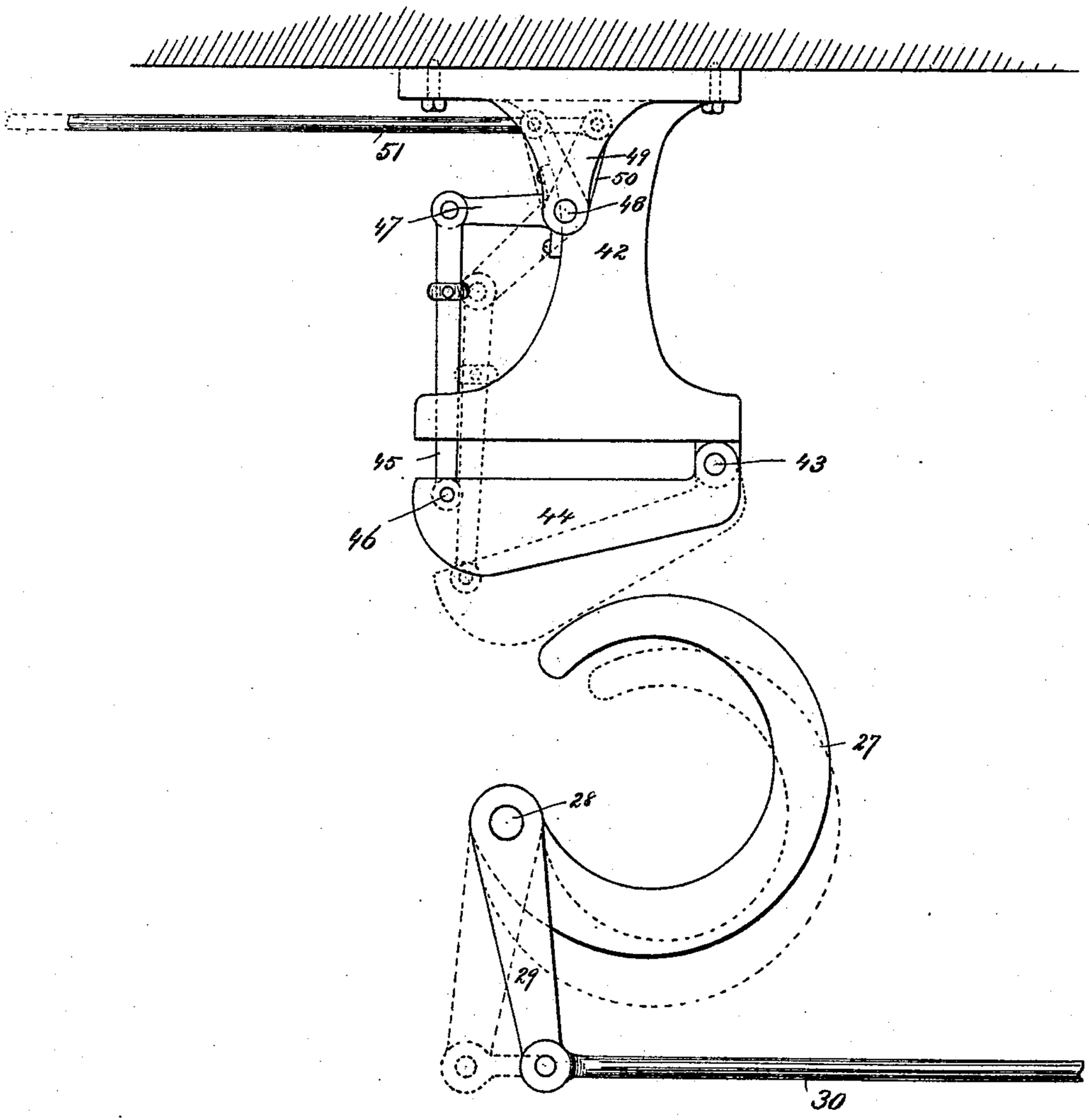
(No Model.) 3 Sheets—Sheet 3.

G. W. VOORHEES.

AUTOMATIC RAILWAY SWITCH.

No. 390,999. Patented Oct. 9, 1888.

Fig. 5.



Witnesses,
John F. Nelson.
Lillie Hanna.

Inventor,
George W. Voorhees.
By Knight Bros
Attorneys.

UNITED STATES PATENT OFFICE.

GEORGE W. VOORHEES, OF SOUTH AMBOY, NEW JERSEY.

AUTOMATIC RAILWAY-SWITCH.

SPECIFICATION forming part of Letters Patent No. 390,999, dated October 9, 1888.

Application filed February 20, 1888. Serial No. 264,660. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. VOORHEES, a citizen of the United States, residing at South Amboy, county of Middlesex, and State of New Jersey, have invented certain new and useful Improvements in Automatic Railway-Switches, of which the following is a specification.

This invention has for its object the automatic adjustment of railway switches and signals designed to be operated by the approach of any train or trains in any direction on any track, and to make a misplaced switch or a meeting of trains at a crossing or switch a matter of impossibility, except through the inexcusable negligence of the engineer in charge of an approaching train in his not paying attention to signals which are by the mechanism hereinafter described set for him. This device is also capable of being operated by hand by attaching a handle or lever on the segmental arm, hereinafter described, the construction being such that even in case switches are left open by accident or with evil intentions the engineer will see the danger-signal, which must also be changed with the switch, and by a simple movement throw the switch into position, allowing his train to pass through, providing, of course, he has the right of way by the rules of the road or from the train-dispatchers.

The arrangement of rods, levers, &c., constituting this invention is shown in the accompanying drawings.

Figure 1 is a plan view of the system as applied to a single track. Fig. 2 is a side elevation of a portion of the switch-shifting mechanism in the direction indicated by arrow-head A, Fig. 1. Fig. 3 is a side elevation of another portion in the direction indicated by arrow-head B, Fig. 1. Fig. 4 is a similar view of another portion in the direction indicated by arrow-head C, Fig. 1. Fig. 5 is a form of bunter for auxiliary mechanism.

In the drawings is shown a system designed to operate switches for outgoing and incoming trains running from a double to a single track, and vice versa, with a siding.

Letters represent as follows: X, the inbound track; W, the outbound track; Y, the main single track; Z, the siding.

The switch, as shown, is set for an incoming train, as indicated by arrow-head, and trains could continue passing through in that direction without changing the position of the switch; but if a train were coming in an opposite direction on the main line the switch would have to be thrown over to allow the train to pass on the outbound track. This is accomplished by the engineer applying a device which I shall presently describe, and which is an auxiliary to the automatic mechanism.

The crank-levers 1 2, Fig. 3, of such shape as to be operated by the wheels of a train, are fixed close to the rail at one end of the rock-shafts 3, which are mounted in suitable bearings. At the other end of said shafts are rock-arms 4, connecting with the pull-rods 5, which pass through guides 6.

The crank-lever 1 (through its rod 5 and rod 7) connects with the bell-crank lever 10, the rod 11, and, finally, the cross-bar 12, to which the switch-rails 13 are firmly secured. Crank-lever 2 connects, through its rod 5, rod 14, bell-crank lever 15, and rod 16, with cross-bar 17 of the switch-rail 18.

In the mechanism represented by Figs. 2 and 4, which are detail views of the switch mechanism at the branch Y and Z, respectively, Fig. 1, the crank-lever 1, through its rod 5 and rod 7, connects with the slide 8 by means of a hook on the end of rod 7 engaging with a pin on said slide. The rod 9 is attached to the slide 8, and through it the bell-crank lever 10, the rod 11, and, finally, the cross-bar 12, to which the switch-relays 13 are permanently secured. A similar device may, if desired, be used on each branch of the track, so that a train coming in any direction can operate the switches; but by the ordinary rules of railroading a train must run on the out or in track, according to its destination, except when special orders are given. The slide 8, however, as will hereinafter appear, is not necessary at the branch X, Fig. 1.

In Fig. 3, which represents the mechanism in the inbound track X, I have shown the crank-levers 1 and 2 as having been depressed by the wheels of a train and, through their connections already described, throwing the switches in position, and at the same time operating or adjusting the other devices at Y and Z by means of their connections with cross-bars 12 and 17.

Fig. 2 illustrates the position assumed by the other device on the main line Y. As will be seen, the crank-lever 2 is shown depressed

and the hook-rod 7 disengaged from the pin on the slide 8, thus allowing the crank-lever 1 to be depressed by the train in passing without affecting the switches, and leaving the main line X Y open for incoming trains. This disengagement is caused by a pin, 19, (on hooked rod 7,) being acted on and raised by a segmental lever or arm, 20, moving on pivot 21, and having a cam-slot, 22, in which the pin 19 rests. On the slide 8 being moved to the position shown in Fig. 2 by its connections with the switch cross bar 12 when the latter is shifted by an incoming train, as already described, the arm 20 is moved to the position shown through the rod 23, lever 24, and slotted rod 25. When the crank-lever 1 is depressed by the contact of the wheels, it carries with it on its arm 4 the slotted rod 26, which, by its connection with the aforesaid arm 20, partially rotates it and allows the hooked rod to drop again and rest on the pin without engaging until the slide is returned to a position with its pin under the hook by operating the switch from the end X, as shown in Fig. 3.

Of course a train coming in the opposite direction must take the outbound track, so I provide an additional crank-lever, 27, situated at any desirable point between the crank-levers 1 and 2 and the switch, and operated by a device on the locomotive. (Shown in Fig. 5.) This crank-lever 27, on being struck, is depressed, and rotating, its rock-shaft 28 causes the rock-arm 29 to pull on the rod 30, and, through bell-crank lever 31 and rod 32, the switch cross-bar 12 is moved into position for passage of an outbound train in the direction Y W.

To make a complete switch system adapted for any emergency, this auxiliary mechanism is very important, and should be in place to operate on approaching the switch from any direction.

The siding mechanism Z is shown in Fig. 4 as being in its normal position when the main switch is open, as shown in Fig. 1. The crank-levers 1 and 2 are moved precisely as before described, and the mechanism has assumed the same position as in Fig. 2, with the exception of the hooked rod 7 remaining in engagement with the pin on the slide 8.

In order to side-track a train it is necessary to use the auxiliary lever 27 to operate the switch 18 through its connections, as described. In so doing the rod 33, attached to the switch cross-bar 17, exerts a pull on one end of bell-crank lever 34, and consequently pushes the segmental arm 20 into an upright position by its rod 35, thereby unhooking and disengaging the rod 7 and rendering the crank-lever 1 inoperative when depressed.

The segmental arm or lever 20 in its movement carries with it the rod 25, and also the rods 26 and 36, their motion being taken up by the slots in each. The use of these slotted rods 25 and 26 I have already shown. Rod 36 is for the purpose of operating the lift-lever 37, on a projection of which a hooked rod, 38, rests. A lever, 39, gives longitudinal movement to the rod 38 by being operated by another rod, 40, connected with the crank-lever 41. This crank-lever 41 is only used on such occasions as accidental or malicious moving of the segmental lever or arm 20 to the position indicated in Fig. 2, which would push down the lift-lever 37 and allow the hooked rod 38 to engage with a pin on the rock-arm 4 of the crank-lever 1, thus connecting the two crank-levers 1 and 41. So that if the crank-lever 1 is depressed the crank-lever 41 will be up, and will, when depressed, raise the crank-lever 1 into position to act upon the switch cross-bar 12.

Of course the crank-levers which act upon others on the same track must be far enough apart to allow for the length of the train. If they were not, the switch would be constantly moving back and forth, and when one lever was depressed another would be raised, consequently breaking or bending one or both in case wheels were on both at the same time. Therefore crank-levers 27 and 41 on their respective tracks must be situated at as great a distance as would be practicable.

The work of crank-lever 41 on the automatic mechanism may be done by the auxiliary, and it is shown as being one of the ways by which the desired result can be obtained. The long rod-connections may be made of ordinary rods or tubing with threaded ends or couplings, which can be screwed up to take up the wear or adjusting, as desired, the whole mechanism being inclosed or covered to protect it from the weather in any way.

Fig. 5 illustrates one device which may be used to operate the auxiliary. It consists of a bracket, 42, preferably bolted or secured to the under part of the locomotive; but it may be at any convenient part of the train. This bracket 42 supports the pin 43, on which is pivoted the shoe or bunter 44, which is operated by the rod 45, pivoted at 46, and connecting with the arm 47 on the rock-shaft 48, journaled in ears 49 on the bracket 42. The rock-shaft 48 is rotated by its rock-arm 50 and the pull-rod 51, which is connected with the air-brake or other mechanism. So that when the engineer desires to shift a switch from his engine he applies the air, and through the consequent movement of the brakes the rock-shaft 48 is partially rotated, throwing down one end of the shoe 44, which on coming in contact with the crank-lever 27 depresses it, as shown in dotted lines, and shifts the switches, as hereinbefore described.

Having already described the mechanism, I will endeavor to make its operation more clear by following the movements made by a train in shifting the switches.

Suppose a down train on the main track Y is coming in the direction of the switches which have been left as in Fig. 1 by an up coming train. As before stated, the crank-levers 1 and 2 are depressed. The engineer

therefore operates the auxiliary crank-lever 27 at Y, which shifts the switch-rails 13 through the connections 28, 29, 30, 31, and 32 and passes on the down track W to its destination. On its return on the track X, the crank-lever 1, which has been thrown up by its connections 11, 10, 9, 8, 7, 6, 5, 4, and 3 with the moving switch cross-bar 12, is depressed, shifting the switch-rails 13 again into their place to allow a passage on the main track X Y; but in case it is necessary to side-track a train the crank-lever 27 at X is called into use, operating in this instance on the switch-rails 18 through the connections 28, 29, 30, 31, and 32. At the same time crank-levers 2 at Y and Z are operated through their connections 16, 15, 14, 6, 5, 4, and 3. That at Y is thrown up to provide for a train coming in that direction and that at Z is depressed. A disengagement of the hooked rod 7 at Z with the slide 8 is also effected by the connections 33, 34, and 35 and segmental lever 20, so that in passing over these crank-levers 1 and 2 the switches remain as they are and in position for the train to back out again. If, however, a train has passed down on line Y W in the meantime, the switch-rails 13 and 18 have been shifted by its wheels bearing on the crank-levers 1 and 2 at Y, and consequently the corresponding crank-levers 1 and 2 at Z have been acted on by their connections aforesaid and crank-lever 2 has risen in position to reverse its switch in backing out from the siding and crank-lever 1 has been disconnected and depressed. In moving out on the main line X again the wheels depress the crank-lever 2 on the siding Z, shifting the switch-rails 18, and consequently raising the corresponding crank-levers 2 at X and Y. The backing out on the line X effected, the wheels depress the lever 2 at that which causes the same lever at Y to go down and that at Z to rise again, and also disconnects the crank-lever 1 at Z through the connections 33, 34, and 35, segmental lever 20, and hook-rod 7. The switches are now in position, completing the return of the train on the track X Y, and are so shown in the drawings. The train passes over the switches and crank-levers 1 and 2 at Y without effecting any further movement of mechanism and goes on to where it started from.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. In a railway, at the junction of two tracks, the combination, with the two switches 13 18 and the bars 12 17, upon which said switches are mounted, of the crank-levers 1 2, adapted to be operated by the moving train and connected to bars 12 17, respectively, substantially as and for the purposes set forth.

2. In a railway, at the junction of two tracks, the combination, with the two switches 13 18 and the bars 12 17, upon which said switches are mounted, of bell-cranks connected to said cross-bars and adapted to reciprocate the latter in opposite directions, the crank-levers 1 2, pivoted adjacent to the tracks and adapted to be depressed by the moving train, and said crank-levers being connected to said bell-crank for operating the latter, substantially as set forth.

3. In a railway-switch, the combination, with the crank-levers 1 2, pivoted on the track in advance of the switch in both directions and adapted to be depressed by the moving train, of a slide having a pin connected to said levers, a rod connected to said switch for operating it and having a hook or notch adapted to engage said pin, and the segmental lever connected with said crank-levers and adapted to disengage said notched rod and pin, substantially as shown and described.

4. The combination, with a bunter carried by the train, the cross-bars 12 17, and the switches 13 18, secured to said bars, respectively, of the bell-cranks 10 15 31, located at both ends of said bars and connected thereto, the levers 1 2, arranged to be depressed by the moving train and connected to bell-cranks 10 15, and the levers 27, adapted to be depressed by said bunter at will and connected to bell-cranks 31, substantially as set forth.

5. The combination, with a bunter on the train, of the auxiliary lever 27, adapted to be engaged by said bunter, the switch 18, connected to said lever, whereby said switch is operated, the slide 8, the switch 13, connected to said slide, a pin or catch on said slide, the lever 1, a rod connected to said lever and having a hook adapted to engage said pin, and the segmental lever 20, engaging said rod for disengaging it with said pin, and connected to the switch 18, whereby said lever is operated, substantially as set forth.

6. The combination, with the switch and the lever 1, of the slide 8, connected thereto, a pin on said slide, a rod, 7, secured to lever 1 and having a hook adapted to engage said pin, the pin 19 on said rod 7, the lever 20, engaging pin 19, the lever 24, and the rods 23 25, connected to both ends of lever 24 and to the slide 8 and lever 20, respectively, substantially as set forth.

7. The combination, with the switch and the levers 1 41, having crank-arms, of the slide 8, connected with the switch by a permanent joint and with the lever 1 by a temporary joint, a lever, 20, for breaking said temporary joint, connected with the switch, the levers 37 39, the former being connected with lever 20 and the latter at one end with lever 41, a hooked rod pivoted to the other end of lever 39 and adapted to engage said crank-arm of lever 1, and a pin or projection on lever 37 for causing the disengagement of said hooked rod and crank-arm of the lever 1, substantially as set forth.

GEORGE W. VOORHEES.

Witnesses:
AMOS G. BOLTON,
CHAS. S. WOLCOTT.