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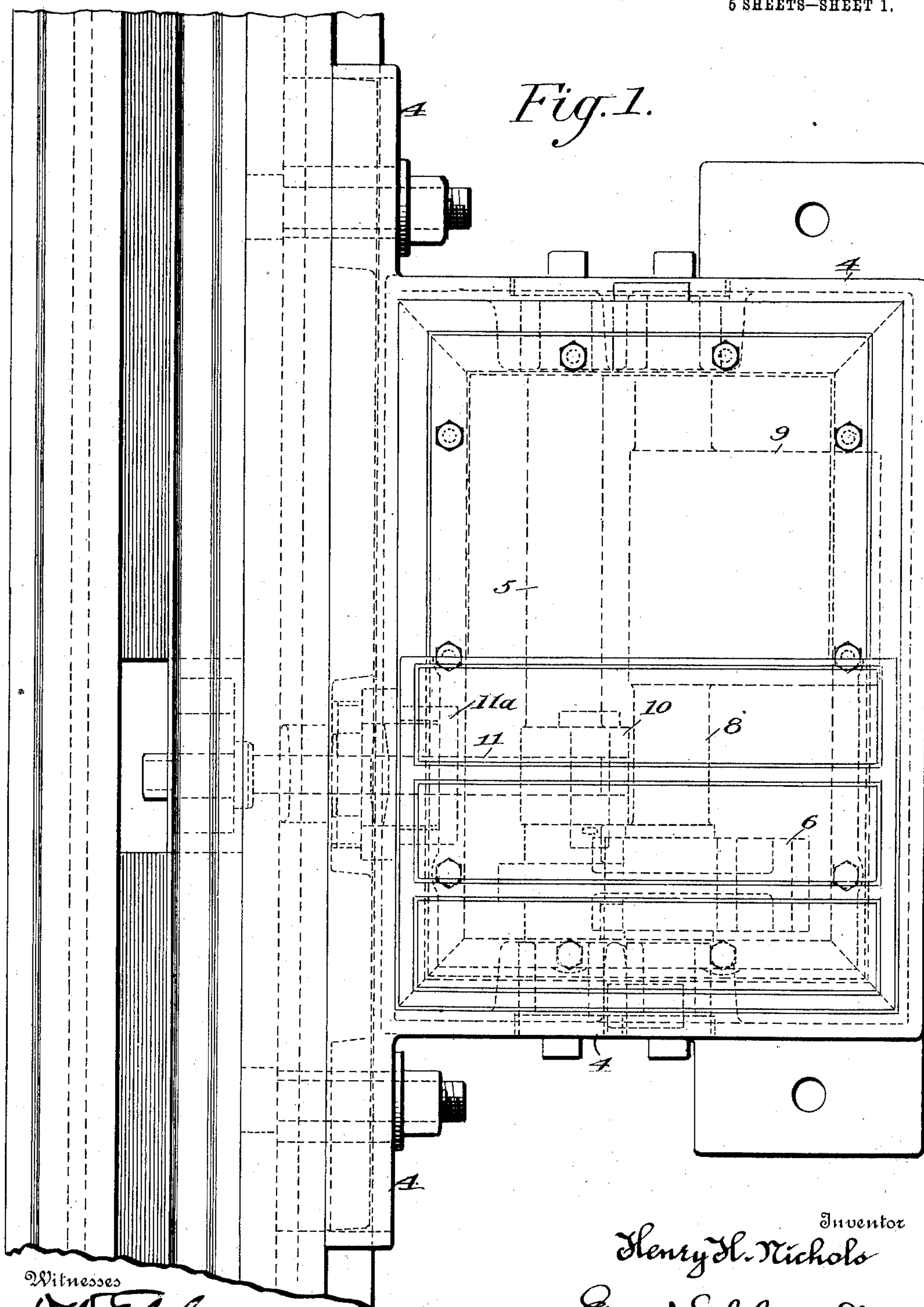
PATENTED AUG. 27, 1907.

H. H. NICHOLS.

SWITCH LOCKING DEVICE AND OPERATING MECHANISM THEREFOR.

APPLICATION FILED FEB. 9, 1907.

6 SHEETS—SHEET 1.



Witnesses

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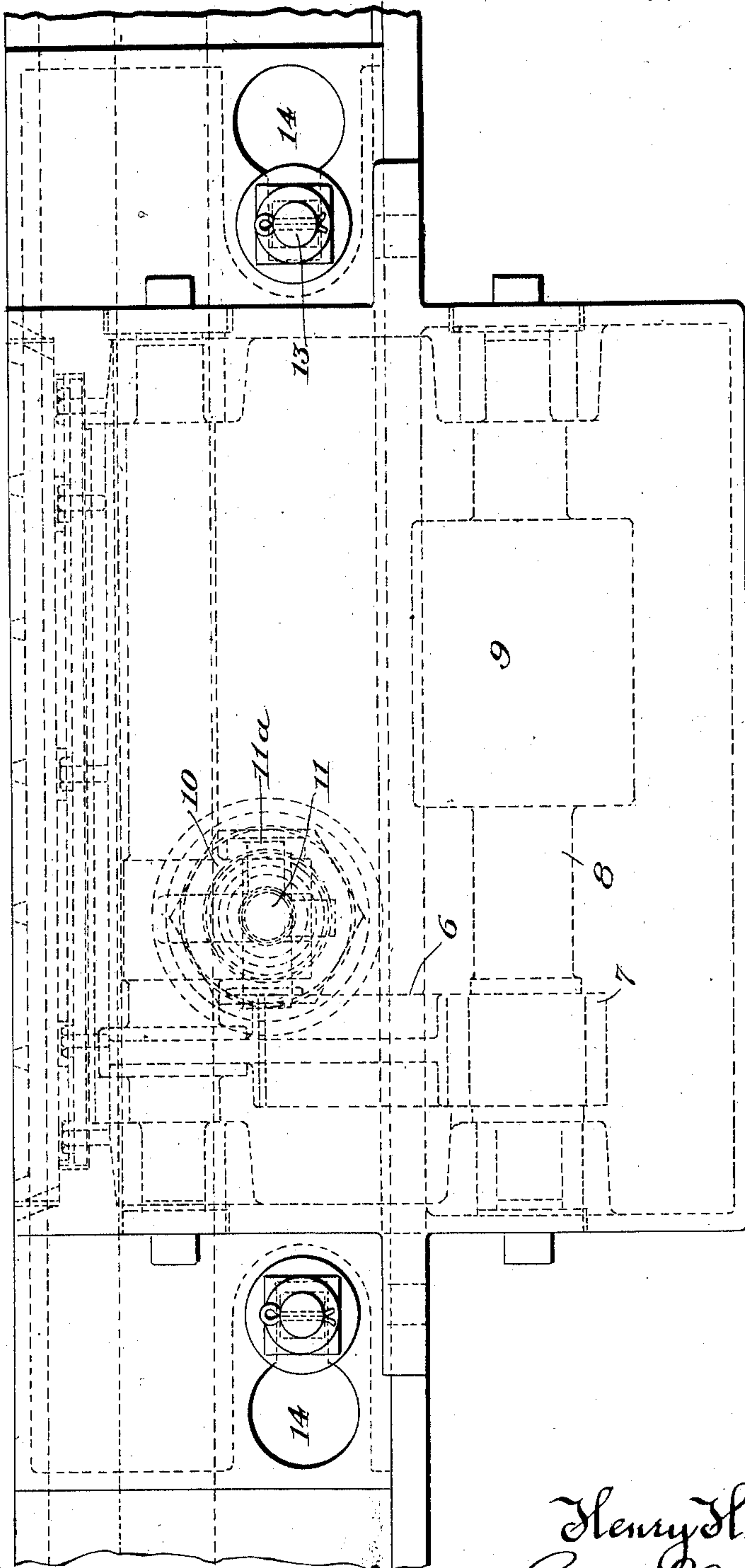
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5 SHEETS—SHEET 2.

Fig. 2.



Witnesses

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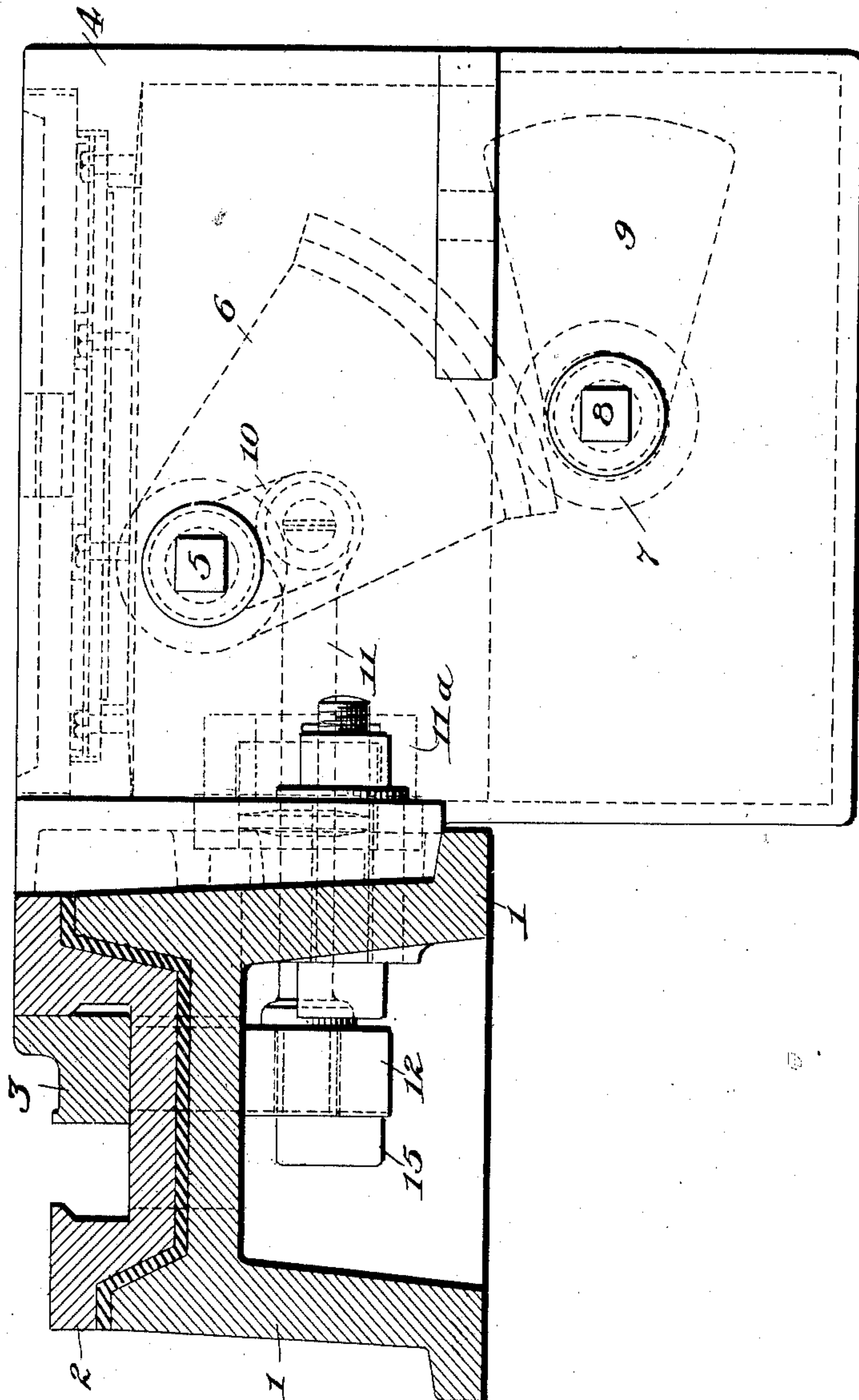
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5 SHEETS—SHEET 3.

Fig. 3.



Witnesses

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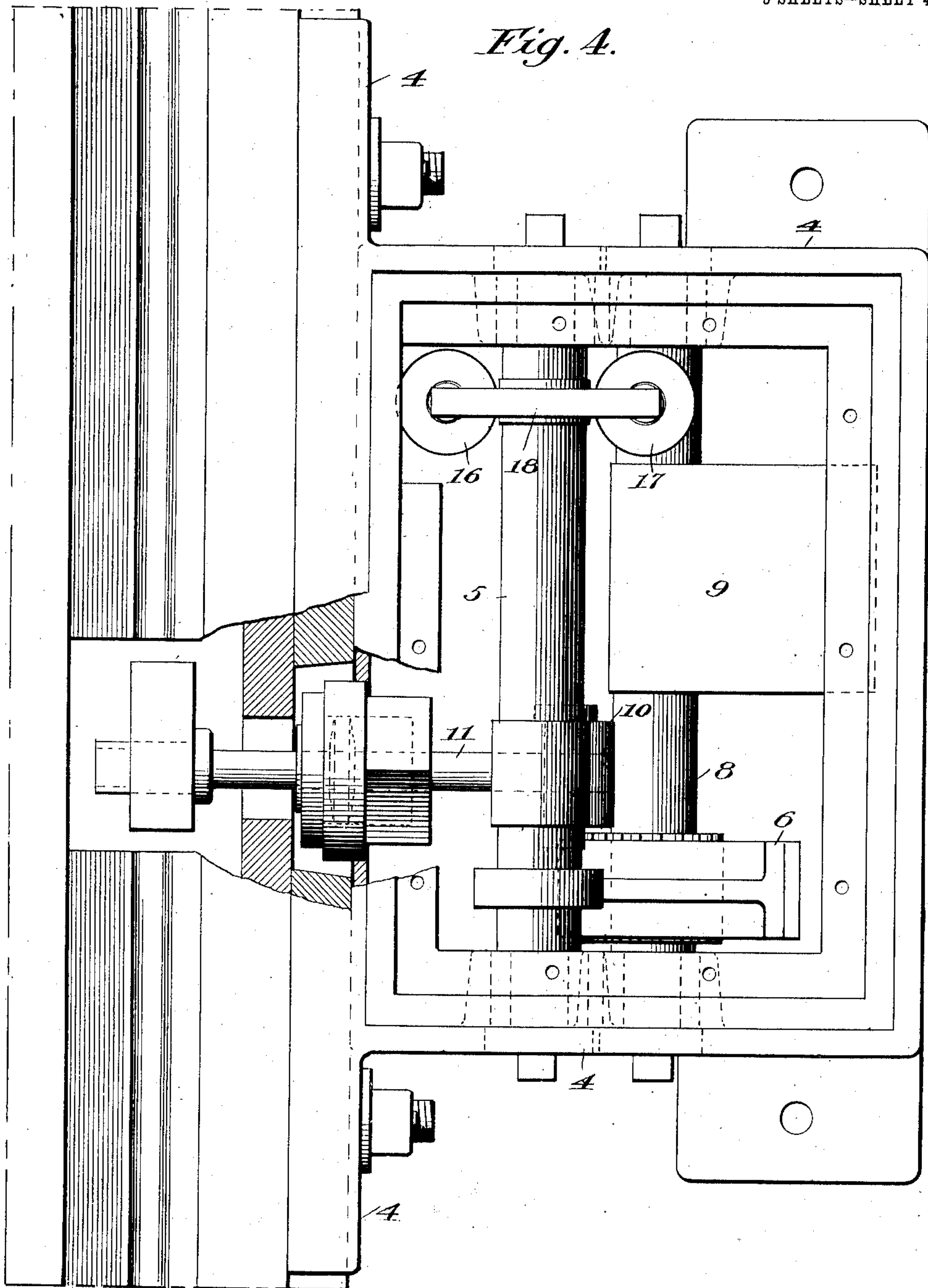
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5 SHEETS—SHEET 4.



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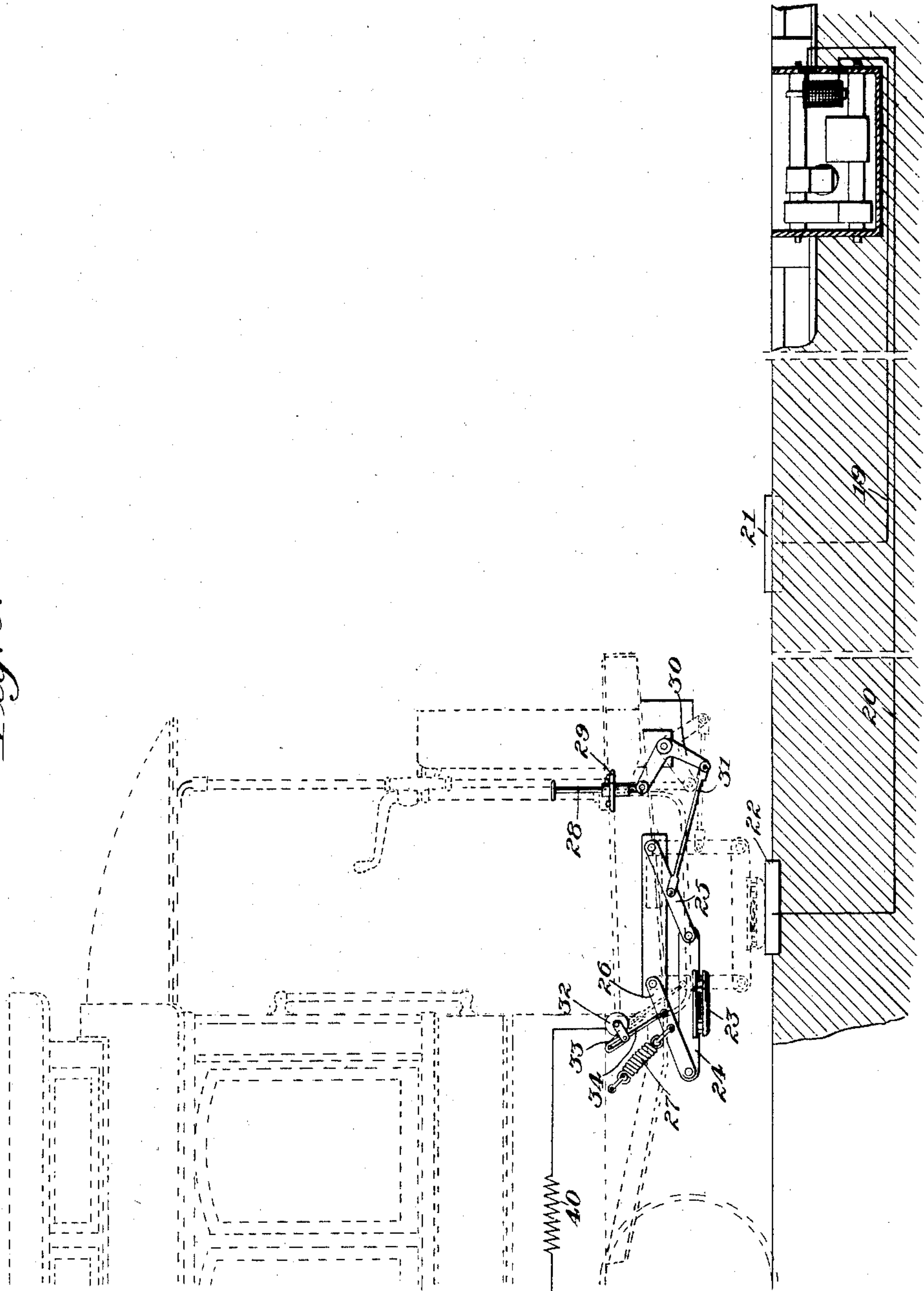
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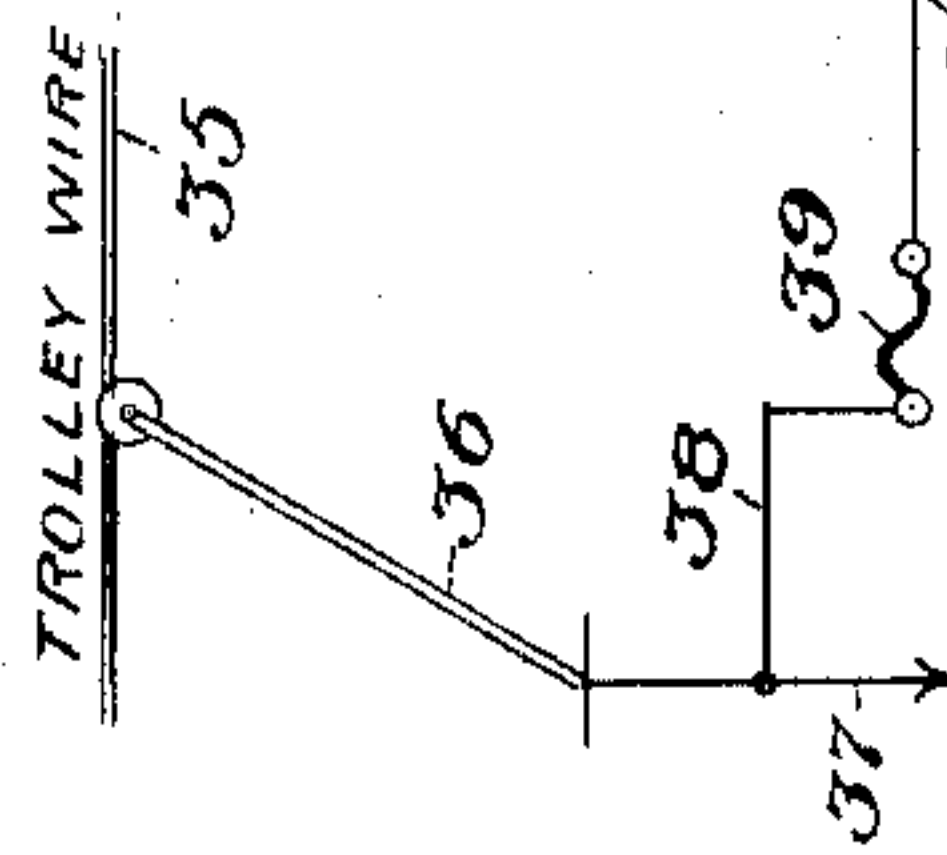
5 SHEETS—SHEET 5.

Fig. 5.



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UNITED STATES PATENT OFFICE.

HENRY H. NICHOLS, OF PHILADELPHIA, PENNSYLVANIA.

SWITCH-LOCKING DEVICE AND OPERATING MECHANISM THEREFOR.

No. 864,681.

Specification of Letters Patent.

Patented Aug. 27, 1907.

Application filed February 9, 1907. Serial No. 356,611.

To all whom it may concern:

Be it known that I, HENRY H. NICHOLS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have
5 invented certain new and useful Improvements in Switch-Locking Devices and Operating Mechanisms Therefor, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to railway switch mechanism,
10 and has for its object the production of operating and locking mechanism for railway switches, together with an improved arrangement of the switch parts, whereby the switch-tongue will be thrown positively and held securely in both directions, and whereby the said tongue
15 may be operated from a moving car.

Briefly stated, the invention comprises a box or casing secured upon one side of the switch so as to have its top flush with the street level, an oscillating shaft journaled in said box with its axis parallel to the rail, a
20 crank on said shaft detachably connected through the side of the box with a drop lug on the switch-tongue, a segmental rack fixed on said shaft, a pinion engaging said rack and carried on a second shaft lying parallel to the first, and a heavy weight eccentrically carried
25 on the second shaft so as to be thrown over past center through the medium of the rack and pinion by partial movement of the switch-tongue, said movement being then completed by force of gravity acting on said weight. In order to operate this mechanism from a moving car,
30 I provide in the switch box a suitable electric motor for turning the operating shaft, and circuit connections for direct and reverse operation of said motor to surface contacts located in proximity to the rails; while upon the car I provide a swinging contact with controlling
35 mechanism whereby it can be thrown down by the motorman so as to touch any one of said surface contacts at will.

My invention is illustrated in the accompanying drawings, in which—

40 Figure 1 is a top plan view showing parts in dotted lines, Fig. 2 is a side elevation of the casing and a portion of the switch body with parts shown in dotted lines, Fig. 3 shows an end view of the casing with parts in dotted lines, the switch tongue and body being shown
45 in section, Fig. 4 is a top plan view similar in all respects to Fig. 1 except that an electric motor is shown connected to one of the operating shafts, and parts are broken away, and Fig. 5 is a diagrammatic view showing the method of operation of the switch by a motor-
50 man on a passing car.

Referring to the drawings, and especially to Fig. 1, 1 designates a channel iron or sleeper having secured upon its upper face the switch plate 2 in which the switch tongue 3 lies and is moved. Removably se-
55 cured to the channel iron so that its top is substantially flush with the thread of the switch plate is a casing 4

filled with oil and in which the operating parts are located as hereinafter described. Journaled in this casing parallel to the switch tongue is a shaft 5 to which is secured adjacent one end thereof the segmental rack 60 6 which engages the pinion 7 secured to a shaft 8 parallel to the shaft 5. This latter shaft 8 carries a balance weight 9 adapted to be thrown past center in either direction by the segmental rack 6.

Keyed to the shaft 5 is a crank arm 10 to which is 65 pivotally secured an operating rod 11 extending through a stuffing box 11^a carried by the casing and through the channel iron or sleeper into removable engagement with a depending arm 12 secured at its upper end to the switch tongue 3. The stuffing box 70 or bushing 11^a is constructed in two halves and fits the casing and the operating rod tightly so that no oil may leak out and thus deplete the supply. The oil in the casing prevents water or dirt from entering the casing and getting into the bearings, rusting the parts or other- 75 wise injuring the mechanism, and at the same time assists in cushioning the weight as it throws back and forth. The crank arm where it is pivoted to the operating rod is slotted instead of being provided with the ordinary pivot hole. This allows for any variation 80 and prevents any lateral movement of the operating rod in the packing box.

The bolts 13 which secure the casing 4 to the supporting channel 1 are passed through key hole openings 14 so that the casing may be disengaged from the 85 sleeper at any time for replacement or other purpose. The depending lug 12 of the switch-tongue is also provided with a key-hole slot through which the operating rod 11 is adapted to pass so that the headed end 15 thereof may be withdrawn and thus disconnect the 90 entire mechanism as well as the casing from the body of the switch.

The operation of the invention thus described is as follows: When the switch tongue is started over by the usual rod applied manually from above, the oper- 95 ating rod pulls upon the crank arm 10 and partially rotates the shaft 5, thus moving the segmental rack over the pinion 7 and partially rotating the shaft 8. After the weight 9 has passed center it drops by gravity, thus snapping the switch tongue over to the oppo- 100 site side and locking it in such position until it is again moved in the opposite direction by the rod from above, the operation being the same as before except that the weight travels in the opposite direction.

In Fig. 4, I have shown a similar view to that of 105 Fig. 1, but with the operating parts in full lines and with the casing and switch plate broken away to show the position of the operating rod. In this figure I also show an electric motor adapted to control the rotation of the shaft 5 which carries the segment 6 and so con- 110 trols the operation of the weight 9. This motor is shown as comprising a pair of solenoids 16—17 with a

yoke 18 common to both and securely fastened in any suitable manner to the shaft 5 intermediate its length, so that each end can be pulled down by its respective solenoid when energized to draw in its core. These 5 solenoids are controlled through the mechanism illustrated in Fig. 5 by the motorman of an approaching car and are connected by wires 19 and 20, (19 connected to the solenoid 17 and 20 connected to the solenoid 16), to contact plates 21 and 22 in the road bed and so 10 arranged as to be engaged by a shoe 23 carried by a connecting link 24 pivoted to the parallel bars 25 and 26. The link 24 carrying the shoe 23 is normally lifted as shown in full lines, by the spring 27 which is connected to the under side of the car and to the parallel bar 26. A plunger 28 passes through a bearing 15 member 29 and engages one arm of a bell crank lever 30 which is connected with the parallel motion by a link 31. Secured to the under side of the car adjacent the parallel bars is a switch 32 having an operating 20 arm 33 engaged by a slotted link 34 connected to the parallel bar 26 so that when this bar is depressed to its full extent the switch is operated to make contact and thereby complete the circuit to the shoe 23. I have indicated in a diagrammatic way a trolley wire 35, 25 trolley pole 36 and a connection 37 leading to the motor. Tapped off this lead is a conductor 38 including a fuse 39 and a resistance coil 40, and connected to one of the switch contacts (not shown) of the switch 32.

The operation is as follows: Upon the approach of a 30 car to the switch, the motorman finding that the switch is set for the curve and being desirous of proceeding upon the main line, he thereupon depresses the foot plunger 28 which through the operation of the bell crank and the parallel bars throws the shoe 23 into engagement with the contact plate 21, thereby supplying 35 current to the magnet 17 over the following circuit. From the generator at the main station over the trolley wire 35, through the trolley pole 36, conductor 38, fuse 39, resistance coil 40, one of the contacts of the 40 switch 32, (the contacts being now in engagement with each other) the opposite contact of the switch 32, the parallel bars, shoe 23, contact plate 21, wire 19, magnet 17 and back to the generator by way of the 45 rails. The solenoid 17 becoming energized rotates the shaft 5 which carries with it the toothed segment 6 and the crank arm 10, thereby throwing the switch so that the main line is clear and operating the weight 9 to lock the switch tongue in position. If it is desired to run the car around the curve to the branch line the 50 shoe 23 is depressed when the car is approaching the contact plate 22 which thereby supplies current through the car circuit already traced but thence over wire 20 instead of 19 to the magnet 16 instead of 17, thereby throwing the switch tongue in opposite direc- 55 tion and locking it in such position by the changed position of the weight 9.

The plunger 28 is insulated from the remainder of the contact apparatus so that the motorman will not be liable to receive a shock. The automatic switch 60 operating system just described may constitute a part of a system of surface contact supply such as is described in patent granted to Edward E. Clement, No. 812,018, February 6, 1906, the contacts in this instance being secured in the road bed in a similar manner to 65 those described in his patent.

It will be clearly understood that the electric motor illustrated in Fig. 4 and herein specifically described is only indicated as a pair of solenoids for the purposes of illustration. Any form of electric motor adapted to rotate a shaft in either direction might be utilized for 70 this purpose and I contemplate the use of any motor constructed to perform the function desired, and any other specific change which might be made in practice and which does not depart materially from the spirit of the invention. All such changes and modifications 75 are considered to be within the purview of the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a railway switch lock the combination with a 80 switch plate and switch tongue thereon, of a casing having its top substantially flush with the switch plate, an operating shaft horizontally journaled therein, a reciprocating connection between the shaft and the switch tongue, an oscillating counterbalance shaft arranged below the 85 operating shaft and also horizontally journaled in the casing, a rack and pinion connection between the two shafts and an eccentric locking weight carried by the counterbalance shaft and adapted to be operated through the rack and pinion connection. 90

2. A switch lock and operating mechanism comprising a rocking shaft carrying a rack and having an eccentric connection to the switch-tongue, a balance shaft carrying a weight and a pinion meshing with said rack, an electric 95 motor connected to the rocking shaft, and circuit connections for said motor.

3. A switch lock and operating mechanism comprising a rocking shaft carrying a rack and having an eccentric reciprocating link connection with the switch-tongue, a 100 balance shaft carrying a weight and having a pinion meshing with said rack, a motor for said rocking shaft, and means for imparting energy to said motor from a moving car.

4. A railway switch lock and operating mechanism comprising a rocking shaft connected with the switch-tongue, 105 and a locking weight therefor, of an electric motor for rocking said shaft, surface contacts for said motor in proximity to the rails at a suitable distance from the switch, and a cooperating contact carried upon a car, together with circuit connections for supplying current 110 through the said contacts to the motor.

5. A railway switch lock and operating mechanism comprising an operating shaft connected to the switch-tongue, a counterbalance shaft geared to the operating shaft, an 115 electric motor for the operating shaft, a surface contact in proximity to the rails and spaced a suitable distance from the switch, and a movable contact carried upon a car adapted to cooperate with said surface contact, together with means controlled by an operator on the car to swing said movable contact into position to engage said surface 120 contact and thereby operate the switch.

6. A railway switch lock and operating mechanism comprising an operating shaft connected to the switch-tongue, an electric motor for the operating shaft, a pair of surface 125 contacts spaced at different points in proximity to the rails and removed from the switch, circuit connections to the motor from said contacts such as to produce direct and reverse movements of the operating shaft respectively, and a movable cooperating contact carried upon a car and controlled by an operator so as to complete the motor circuit 130 through either of the surface contacts at will.

7. A railway switch lock and operating mechanism comprising operating means connected to the switch-tongue, electrical controlling means therefor, circuit connections 135 for said controlling means, means carried on a moving car for completing said circuit connections to operate the switch and means independent of the controlling means for locking the tongue in either position.

8. In a device of the class described, the combination with main line rails and a switch tongue for branch rails, 140 means for moving said switch tongue in either direction to complete either the main line or the branch line rails,

means for locking said switch tongue in either position, and means controlled by the operator of an approaching car to automatically throw said switch tongue in either direction, said locking means being independent of the throwing means.

5 9. In a device of the class described, the combination with main line rails, of a switch tongue for controlling branch line rails, means for positively throwing the switch in either direction, means manipulated by the operator
10 of an approaching car for controlling said throwing means, and a balance weight for locking the switch in either position.

15 10. A switch lock and operating mechanism comprising a rocking shaft carrying a rack and having a reciprocating link connection with the switch tongue, a balance shaft carrying a weight and having a pinion meshing with said rack, a pair of solenoids on either side of the rocking shaft, a common member for said solenoid secured intermediate its length to the rocking shaft, and means for imparting energy to either of said solenoids from a moving car
20 so that the rocking shaft will be operated in either direction.

11. A railway switch lock having an operating shaft, a reciprocating connection from said shaft to the switch

tongue, an oscillating counterbalance shaft, a rack and pinion connection between the two shafts, an eccentric balance weight on said second shaft, and means to cushion the throw of said weight in either direction. 25

12. In a railway switch lock the combination with a switch plate and a switch tongue moving thereover, of a casing secured to the switch plate and having its top substantially flush therewith, an operating shaft horizontally journaled in said casing, a reciprocating connection from said shaft to the switch tongue, an oscillating counterbalance shaft horizontally journaled in the casing below the operating shaft, a rack and pinion connection between the two shafts, an eccentric locking weight on the second shaft adapted to be operated through the rack and pinion connection, and a fluid completely filling the entire casing and thereby adapted to exclude foreign matters from all working parts, said fluid acting also to cushion the throw of the weight in either direction. 30 35 40

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

HENRY H. NICHOLS.

Witnesses:

JAS. S. CLIFFORD,
A. M. HARDINI.