(No Model.) 3 Sheets—Sheet 1.

A. G. LAWRENCE.

AUTOMATIC SWITCH.

No. 402,252. Patented Apr. 30, 1889.

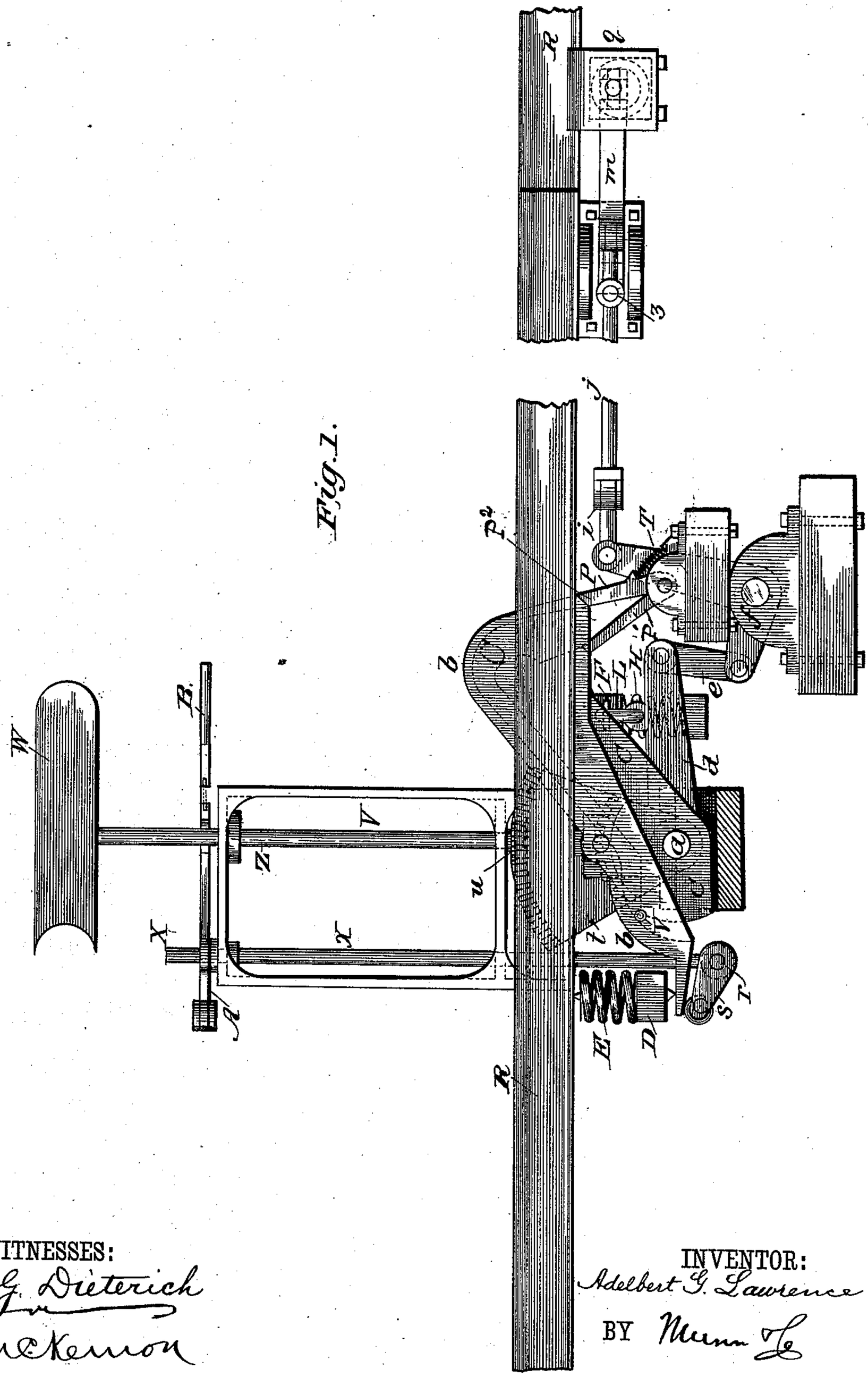

Fig. 1.

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(No Model.) 3 Sheets—Sheet 2.

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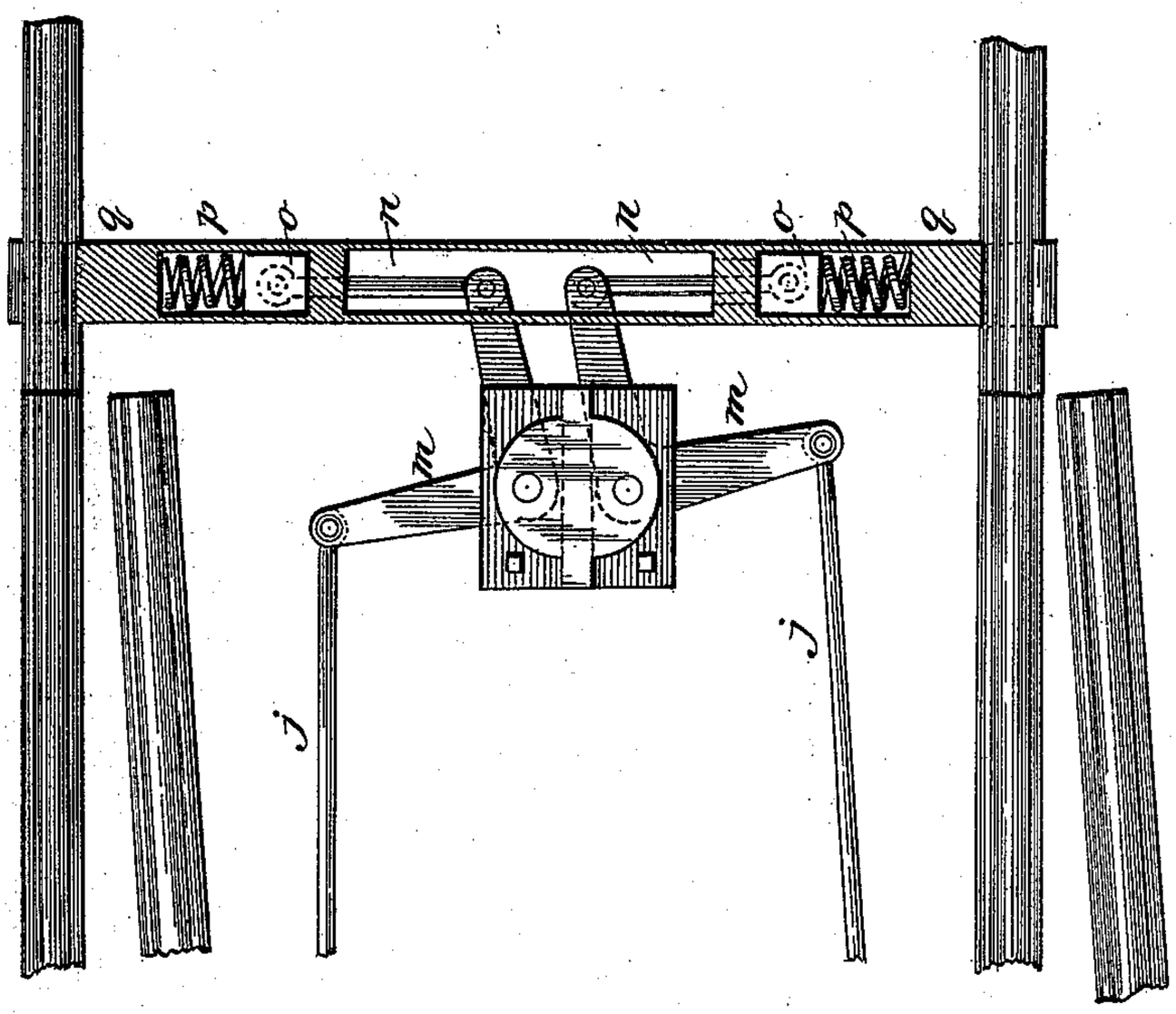
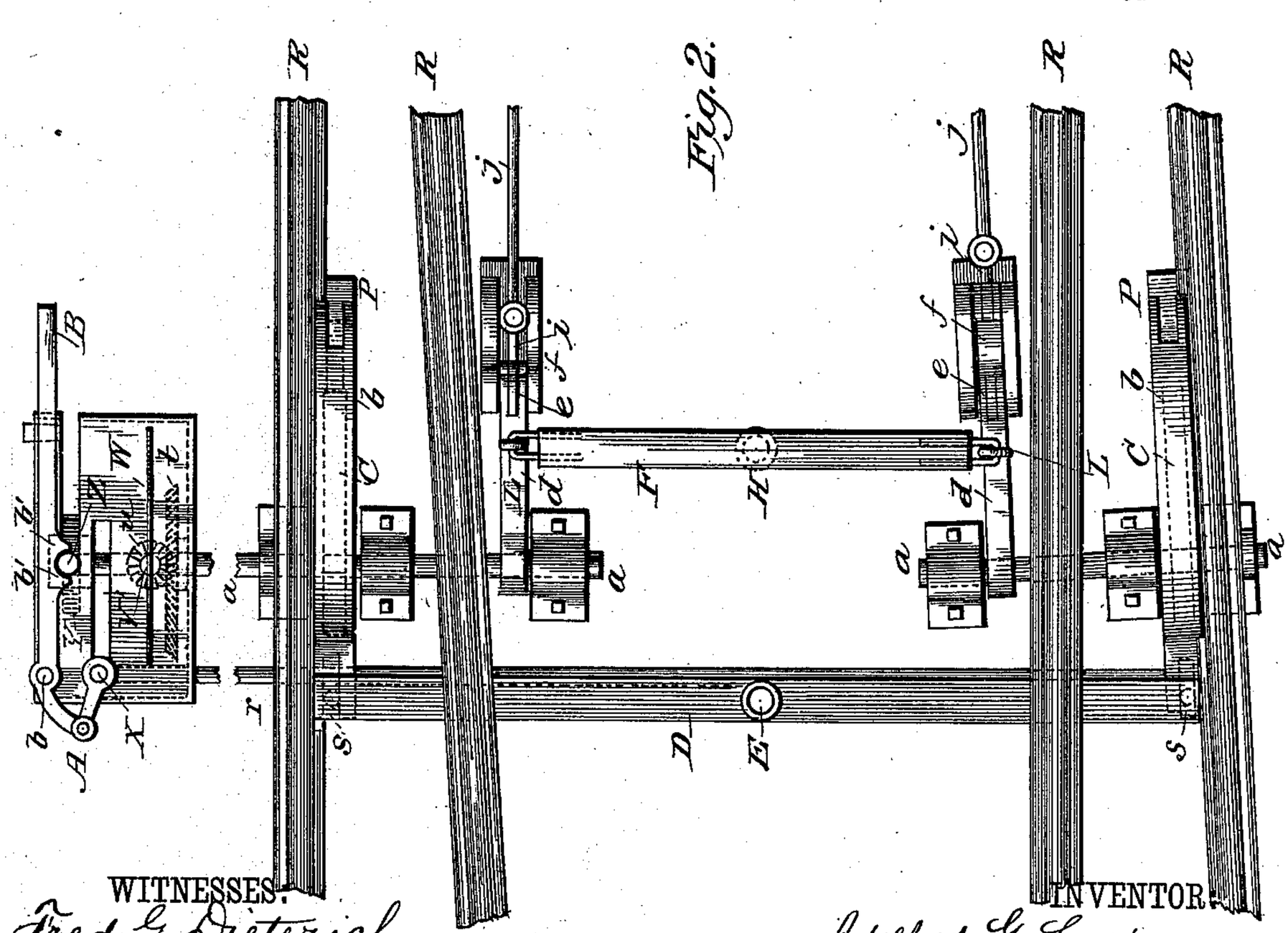


Fig. 2.



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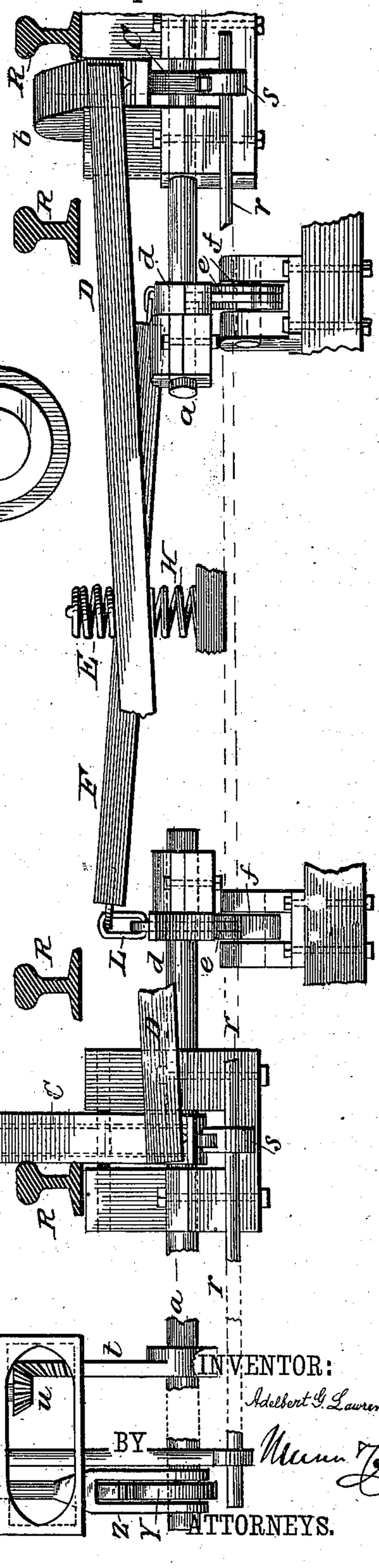


Fig. 4.

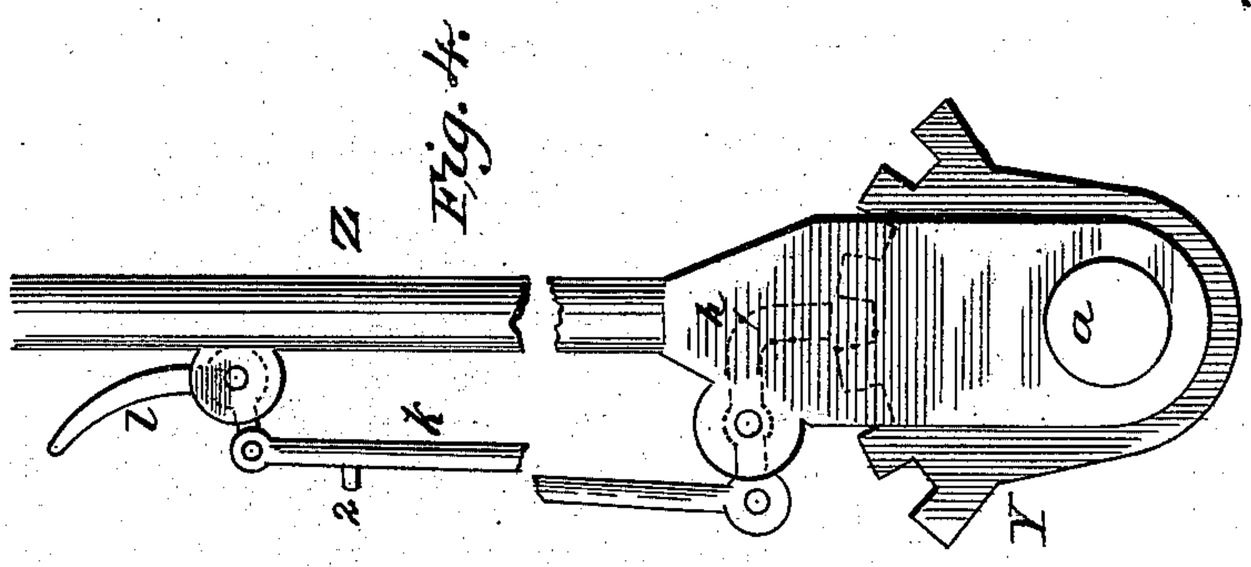
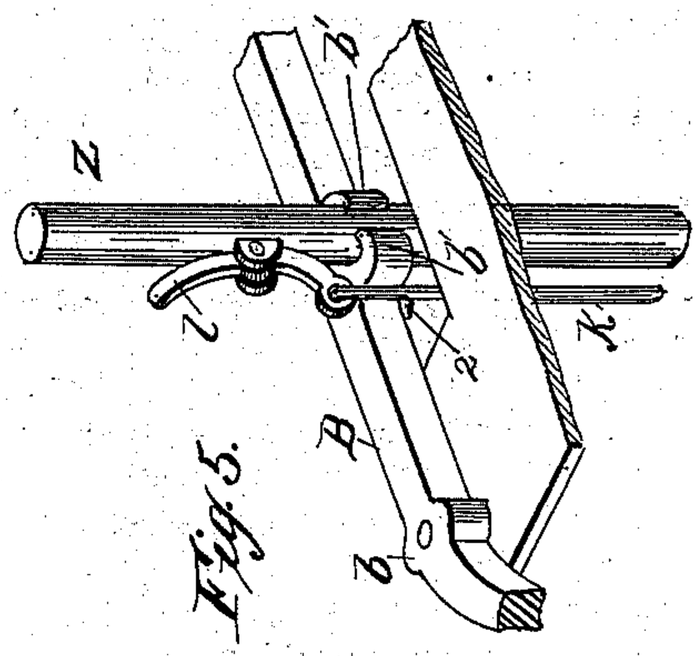
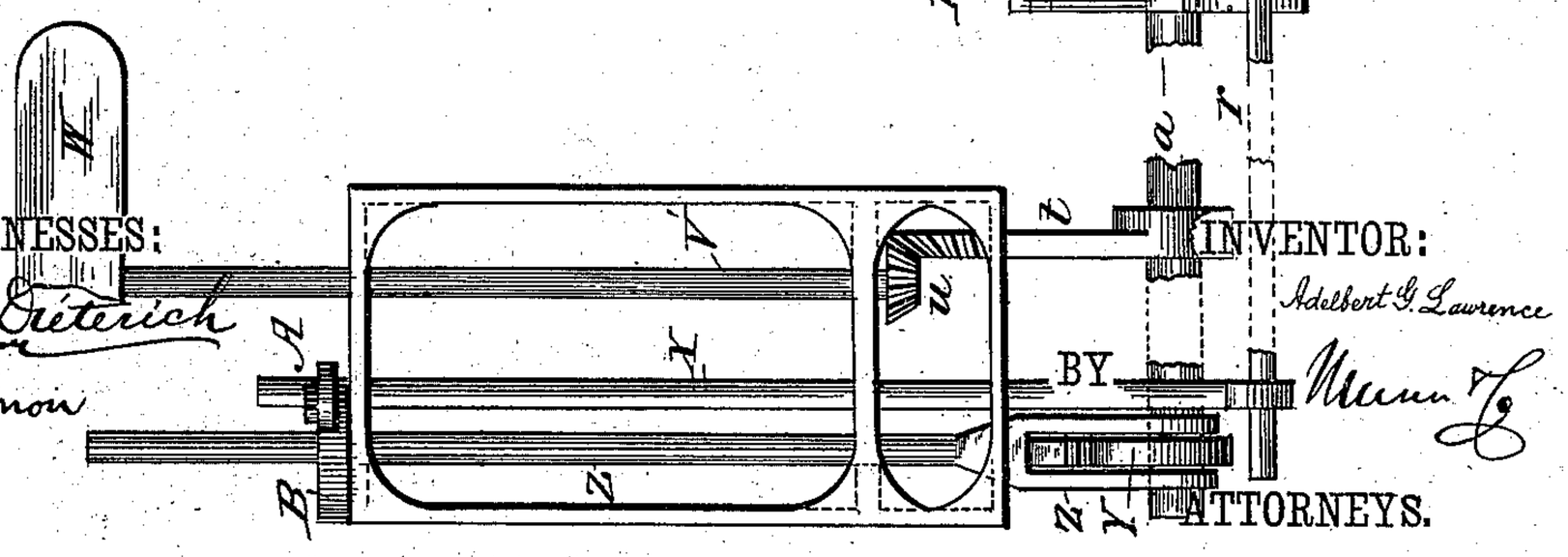


Fig. 5.





UNITED STATES PATENT OFFICE.

ADELBERT G. LAWRENCE, OF MOTLEY, MINNESOTA.

AUTOMATIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 402,252, dated April 30, 1889.

Application filed June 21, 1888. Serial No. 277,859. (No model.)

To all whom it may concern:

Be it known that I, ADELBERT G. LAWRENCE, of Motley, in the county of Morrison and State of Minnesota, have invented a new and useful Machine for Operating Automatically a Railroad-Switch by means of the car-wheel passing over the track; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, in which—

Figure 1 is a side view; Fig. 2, a top view; Fig. 3, a transverse section, and Fig. 4 an outside view of the lever with which the switch is operated by hand; and Fig. 5 is a detail view, of the upper end of the lever Z and its connection with the locking-bar B.

The device consists of two revolving shafts placed beneath and at right angles to the main track and side track, and connected by means of levers, links, and pitmen to a throw-bar underneath, and attached to the movable track, as shown in Fig. 2.

The device is operated automatically by a lever attached to each of the revolving shafts and projecting above the track at a point where the flange of the car-wheel will pass over and press down the lever, thus imparting a rotary movement to the shafts beneath the track. This lever is called the "operating-lever," and is shown at C C C in Fig. 1. Immediately above and around the operating-lever and inclosing it to a point below the track is placed a shield which is hung independent of the operating-lever at a point immediately above where the operating-lever is attached to the shaft *a*, as shown in Fig. 1, and extending back from where the shield is hung is a lever, by which the shield is operated, which is called the "shield-lever." The shield and shield-lever are shown at *b b* in Fig. 1. When the operating-lever is up, the shield occupies a position one inch above the operating-lever, as shown in Fig. 1, and the operating-lever is locked by means of the latch P, which is held in position by the spring T. The latch P, the construction of which is clearly illustrated in Fig. 1, is formed with two arms, P′ P², one of which, P′, normally supports the lever C, while the other, P², is arranged in contact with the lower edge of the shield. Where the shield and latch come in contact, they meet at an angle of forty-five degrees, and when the shield is pressed down one inch it throws the latch back one inch and allows the operating-lever to be pressed down by the shield. To the hub of the operating-lever an eccentric is attached, as shown at V in Fig. 1, and into the shield-lever a small wheel is inserted. When the shield and operating levers are up, the wheel in shield-lever falls into a notch in the eccentric, as shown in Fig. 1, thus allowing the shield to come to its proper position one inch above the operating-lever.

The operating-lever, shield, and shield-lever, and also the levers, links, and pitmen connecting with and attached to the shaft under the side track, are duplicates of the same parts attached to and connecting with the shaft under the main track and occupy reverse positions, so that when the operating-lever attached to shaft under main track is pressed down the operating-lever at side track is thrown up and locked by the latch P, as shown in Fig. 1, and the movable track is thrown to connect with main track, as shown in Fig. 2, and vice versa. When the operating-lever at side track is pressed down, the lever at main track is thrown up and locked, and the movable track is thrown to connect with side track.

The operating-lever C C C in Fig. 1 and the lever *d* are attached to the shaft *a*, as shown in Fig. 1. At the extreme end of the lever *d* the link *e* is attached, and to the lower end of the link *e* the compound lever *f* is attached, and to the upper end of the compound lever *f* the jointed pitman J is attached at *i*, as shown in Fig. 1. The jointed pitman J is attached to the compound lever *m*. The compound lever *m* is attached to the pitman *n*. The pitman *n* is attached to the sliding block *o*, which is held in position by the spiral spring *p*, resting against the solid bearing *q* in the throw-bar attached to the movable track, as shown in Fig. 2.

The walking-bar F (shown in Fig. 3) has a center bearing over the spring H, and is attached to the lever *d* by the link L, as shown in Fig. 3. The spring H having sufficient expansive force to transmit the movement of either lever to the opposing lever, the pressure-bar D has a center bearing beneath the spring

E, and is attached to the shield-lever by a pivoted bearing, as shown in Figs. 1 and 3, or by means of a link similar to that used on the walking-bar F, the spring E having sufficient expansive force to insure the required pressure on the shield-levers to bring them to and maintain them in their proper positions, one inch above the operating-levers when the operating-levers are up.

The pitman-rod J is attached to the compound lever *f* by a perpendicular joint with a pin, as shown at *i*, Fig. 1, and to the compound lever *m* with a horizontal joint and pin, as shown in Fig. 2. Near the perpendicular joint with the compound lever *f* a horizontal joint is made in the pitman J, as shown at *i* in Fig. 1, and near the horizontal joint with the compound lever *m* a perpendicular joint is made in the pitman J, as shown at 3 in Fig. 1. This last-mentioned joint is not shown in Fig. 2, but is shown in Fig. 1. These joints are inserted to allow the pitmen to assume the different positions required in operating the switch.

The spring E over the center bearing of the pressure-bar D and spring H under the walking-bar F, and the springs *p* that rest against the solid bearing *g* in the throw-bar attached to the movable track, have a special office to perform in preventing breaking by reason of concussion in the sudden throwing and stopping of the switch when operated automatically; and also when a car-wheel having a deeper flange than is required to operate the switch passes over the operating-lever the spring E allows the pressure-bar D to pass above, the spring H allows the walking-bar F to pass below, and the springs *p* allow the sliding block *o* to pass beyond the point where the switch is operated without changing the positions of the opposing levers and their connections.

The shaft *a* under main track extends out beyond the track to the signal-stand, as shown in Figs. 2 and 3, where the mitered gear *t* is attached to the shaft *a*, as shown in Fig. 3, and to the signal-shaft *v* the mitered pinion *u* is attached, as shown in Fig. 3. The mitered gear *t* and mitered pinion *u* are of such proportions as will impart to the signal-shaft *v* one-fourth of a revolution when the switch is operated, thus throwing the vane *w* to a right angle or parallel line with the track.

To operate the switch by hand, the hand-lever Z is attached to the shaft *a*, as shown in Fig. 3, by means of the toothed disk *y*, as shown in Fig. 4, the toothed disk being keyed to the shaft between the two legs of the lever, through which the shaft *a* passes, allowing the lever to revolve around the shaft outside of the toothed disk. The hand-lever is made to connect with the toothed disk by means of the dog *h*, as shown in Fig. 4. The dog *h* is operated by the rod *k*, which is attached to the supplementary lever *l*, which is provided with a spring, (not shown in cut,) which holds the supplementary lever *l* out from the lever Z, as shown in Fig. 4. To connect the lever Z with the shaft *a*, the operator grasps the lever Z and compresses the supplementary lever *l*, thus raising the rod *k* and throwing the dog *h* into the toothed disk *y*.

To operate the shield-levers and unlatch the operating-levers by hand, the shaft *r* is placed beneath the shield-levers, as shown in Fig. 1, and extends from the shield-lever under side track across to the signal-stand outside of main track, as shown in Figs. 2 and 3, and at a point immediately below each of the shield-levers the crank-arm *s* is attached to the shaft *r*, as shown in Fig. 1. In the outer end of each of the crank-arms a small wheel is inserted, as shown in Fig. 1. The shaft *r* and crank-arm *s* are placed in position beneath the shield-levers so as to just clear the shield-levers when the shield is up, as shown in Fig. 1.

X denotes a latch-lever, which is connected to the shaft *r* and extends upward and projects through an elongated slot in the switch-stand. The said lever is connected with the outer end of the locking-bar B by a toggle-link, A, as clearly shown in Fig. 2. The bar B, which is pivoted on the switch-stand at *b*, is provided with a forked projection, *b' b'*, which embraces the lever Z when the bar B is in a locked position, and retains the said lever Z in a vertical position, as shown in Fig. 2. To prevent said lever Z from being connected with the toothed disk Y when bar B is locked, a lug, 2, is formed on the rod *k*, which projects at a point just below the locking-bar, as shown. By this construction it will be observed that the rod *k* is thereby prevented from being raised up and the dog *h* prevented from engaging the toothed disk Y when the switch is being operated automatically.

To operate the switch by hand, the operator first unlocks the bar B and throws it out and back, thereby throwing the latch-lever X forward and turning with it the shaft *r*, until the crank *s* on said shaft *r* has raised the shield-lever *s* and pressed the shields down at their outer ends. This movement of the shields presses the dogs or latches P outward, releases the inner arms of said latches from contact with operating-levers C C, and thereby unlocks the same and permits their being operated. The operator then grasps the lever Z, pressing the supplementary lever *l* and connecting dog or detent into engagement with the toothed disk Y, and then throws the lever Z forward or backward until the switch is thrown and locked.

The switch is operated automatically by the flange of the car-wheel first pressing down the shield that incloses the operating-lever until it comes in contact with the operating-lever and throws back the latch that locks the operating-lever, this movement of the shield being for the purpose of unlocking the operating-lever. From the point where the shield comes in contact with the operating-lever the shield presses the operating-lever down also, and as

the pressing down of the shield to the point where it comes in contact with the operating-lever has raised the shield-lever D the small wheel in the shield-lever has also been raised out of the slot in the eccentric, and as the operating-lever is revolved by being pressed down the eccentric is also revolved, and coming in contact with the wheel in the shield-lever holds the shield-lever up and presses the shield down onto the operating-lever. The lever *d* moves down as the operating-lever is pressed down, and being connected by the link *e* to the compound lever *f* it presses the horizontal arm of the compound lever *f* down also and throws the perpendicular arm of the compound lever *f* back. The compound lever *f* being connected by means of the jointed pitman J to the compound lever *m*, a corresponding movement is imparted to the compound lever *m*, which, having a horizontal movement, throws the movable track. The walking-bar F is connected to the levers *d* by the links L, and is hung at the center over the spring H, which has a lift on the walking-bar equal to the power required to carry the movable track, the lift of the spring being imparted equally to the two levers *d*, and when one of the levers is pressed down the walking-bar pulls the opposing lever up and insures a uniform reciprocating movement to the two sets of levers and their connections. The pressure-bar D operates on the shield-levers in a similar manner, but is not essential to secure a uniform reciprocating movement, its main office being to insure a pressure on the shield-levers that will maintain them in position when the shield is up and prevent the shield being pressed down by any ordinary means, and should have a pressure of not less than three hundred or four hundred pounds, and the pressure may be increased to one thousand pounds, or more, if necessary. The pressure-bar and walking-bar may be of wood or iron. All other parts of the switch must be of iron or steel. The shaft connected to the latch-lever is located immediately under the shield-levers, and the crank-arms that lift the shield-levers are located directly under the shield-levers, so as to occupy a nearly-horizontal position when the latch-lever is in a perpendicular position, and there should be sufficient space between the wheel in the crank-arms and the shield-levers to allow the locking-bar that connects with and operates the latch-lever to swing out far enough to release the hand-lever without bringing the wheel in the crank-arm in contact with the shield-lever.

The locking-bar is attached to the switch-stand, as shown in Fig. 2, at a point above the surface, and must be proportioned and connected with the latch-lever, so as to give to the latch-lever the required swing to raise the shield-lever to the point where the latch is thrown from under the operating-lever.

The working parts of the switch, with the exception of the shield and operating-lever, are beneath the track and are covered and protected from dirt, snow, and ice, the shield inclosing the operating-lever being the only part exposed, and as the movement of the shield is perpendicular it cannot clog or become obstructed, as a plate of iron can be so placed as to form a mortise, with a sharp cutting-edge surrounding the shield that would cut away any obstructions like ice or snow that might become attached to the shield.

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

1. In an automatic switch, the combination, with the shaft *a*, the operating-levers C C, said levers connected with each other, means for transmitting reverse motion to said levers, substantially as shown and described, and locking-latches P, the arms P′ of which normally lock the levers C C, of the shields *b*, pivotally secured normally a slight distance above the levers C, their lower outer ends normally supported on the arms P^2 of the latch P, said shield adapted to automatically unlock the levers C C, substantially as hereinbefore described.

2. In combination with the operating-levers and attachments for throwing the switch, as above set forth, the shield *b*, arranged in connection with the operating-lever, as set forth, eccentric V, locking-dogs P, and springs T, all arranged substantially as and for the purpose described.

3. In an automatic switch, the combination, with the shafts *a*, the levers C C, said levers provided with eccentrics V, having a groove in their upper outer edges at their hub ends, of the swinging shields *b b*, extending over and embracing said levers C C, said shields provided with a small wheel journaled transversely in the lower end thereof, said wheel adapted to normally rest in the groove of the eccentric V, and means for operating the levers and shields, substantially as shown and described.

4. The combination, with the shield *b*, of the presser-bar D and spring E, substantially as and for the purpose described.

5. The combination, with crank *d*, of the links L, presser-bar F, and spring H, substantially as and for the purpose described.

6. In an automatic switch, the combination, with the levers *f* and *m*, the pitman-rods J J, the operating-levers C C, and the throw-bar *q*, of the perpendicular joint *i* and the horizontal joint 3, formed in the said rods J, substantially as and for the purpose specified.

7. In combination with the throw-bar *q*, the sliding block *o* and spring *p*, substantially as and for the purpose specified.

8. In combination with the switch-stand, shields *b*, and operating-levers C C, the shaft *r*, cranks *s*, latch-lever X, link A, and locking-bar B, constituting the device for unlocking the dog P, substantially as and for the purpose hereinbefore specified.

9. The combination, with the shaft *a* under

the main track, signal-stand, signal-vane, and the locking-bar B, as set forth, of the lever Z, secured upon the shaft *a*, a toothed disk, Y, mounted on the shaft *a*, a pivoted dog, *h*, engaging the disk Y, the rod *k*, having a lug, 2, said rod connecting the dog with the hand-lever *l*, said lever Z and rod *k* adapted to be engaged by the locking-bar B, and held from movement when said bar is in a locked position, substantially as and for the purpose set forth.

ADELBERT G. LAWRENCE.

Witnesses:
Mrs. P. T. WILLETT,
GEORGE WILLETT.