(No Model.) 3 Sheets—Sheet 1.

T. H. PATENALL.

LOCKING DEVICE FOR SWITCH AND SIGNAL OPERATING MECHANISM.

No. 474,528. Patented May 10, 1892.

Fig. 1.

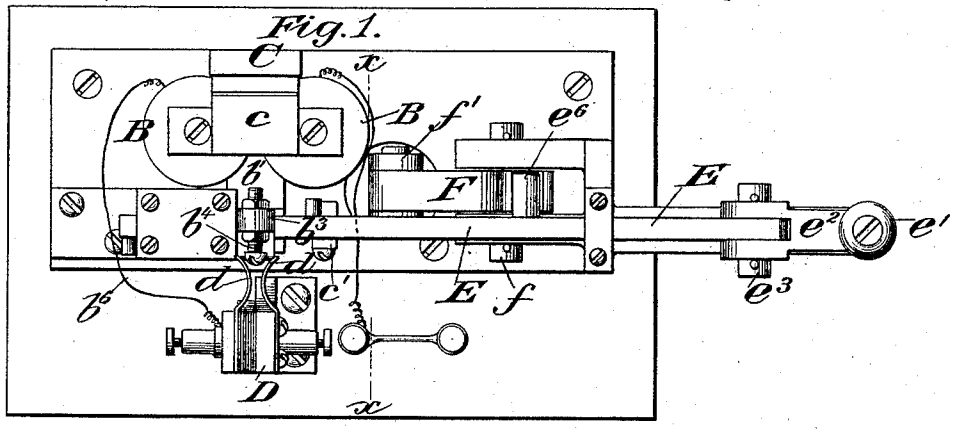


Fig. 2.

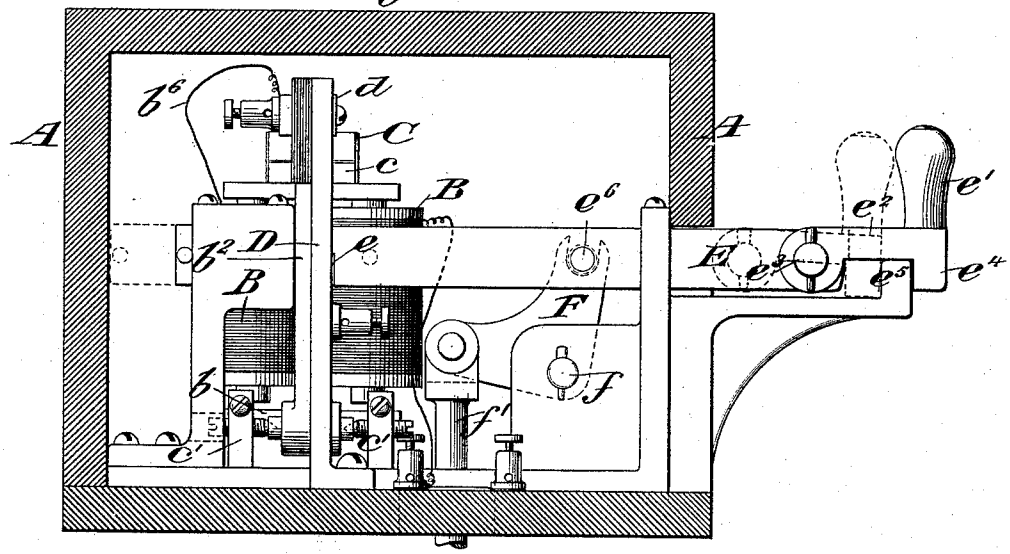
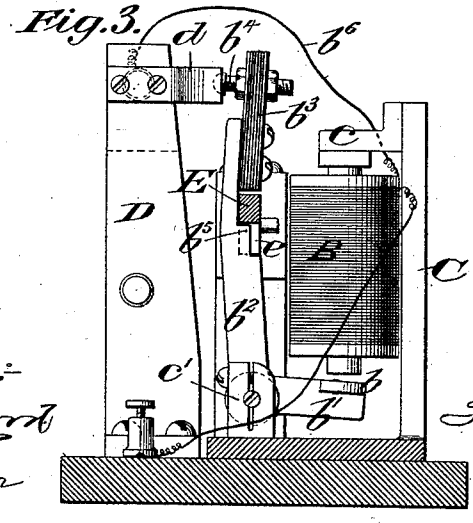


Fig. 3.



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(No Model.) 3 Sheets—Sheet 2.

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No. 474,528. Patented May 10, 1892.

Fig. 4.

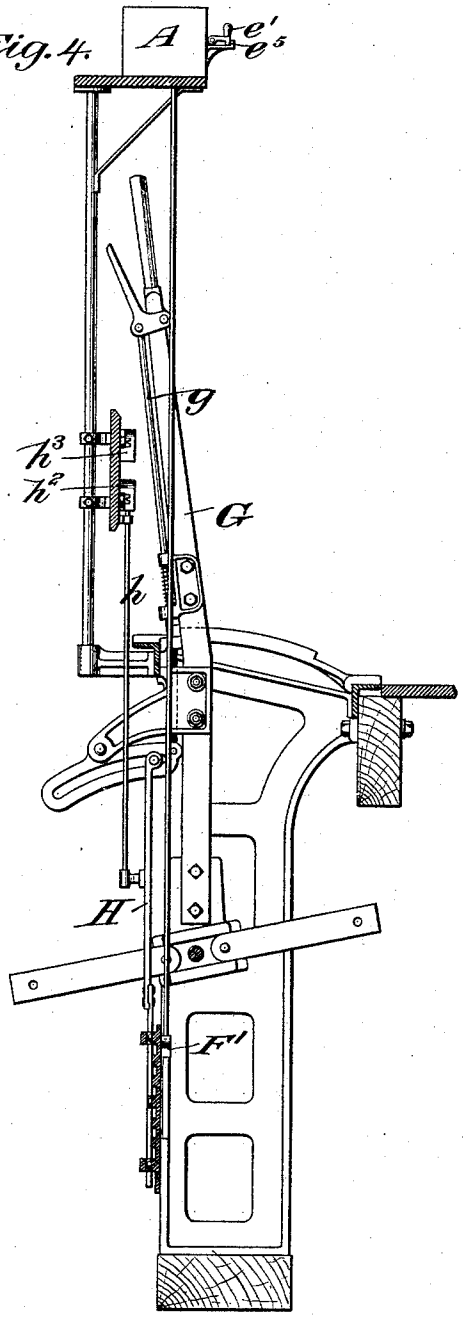
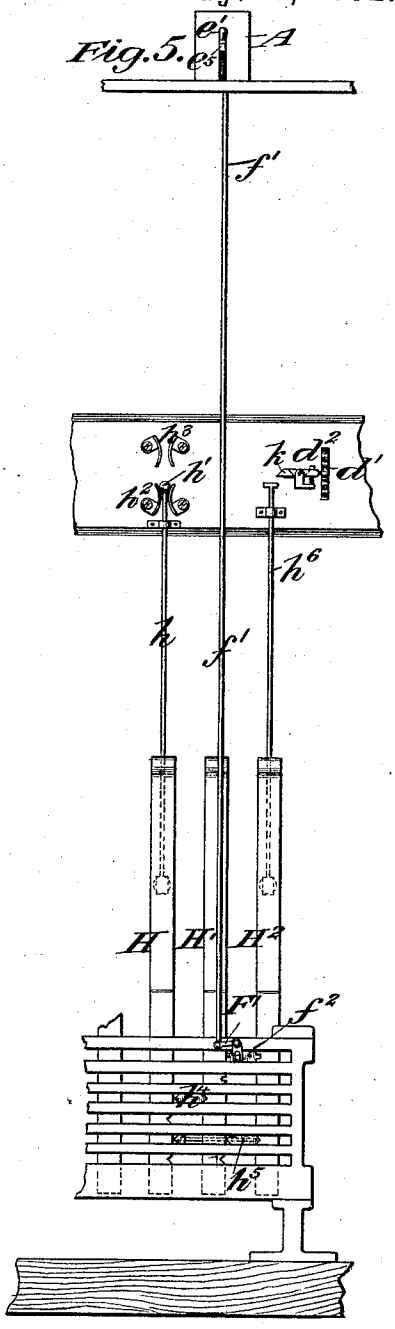


Fig. 5.



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(No Model.) 3 Sheets—Sheet 3.

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LOCKING DEVICE FOR SWITCH AND SIGNAL OPERATING MECHANISM.

No. 474,528. Patented May 10, 1892.

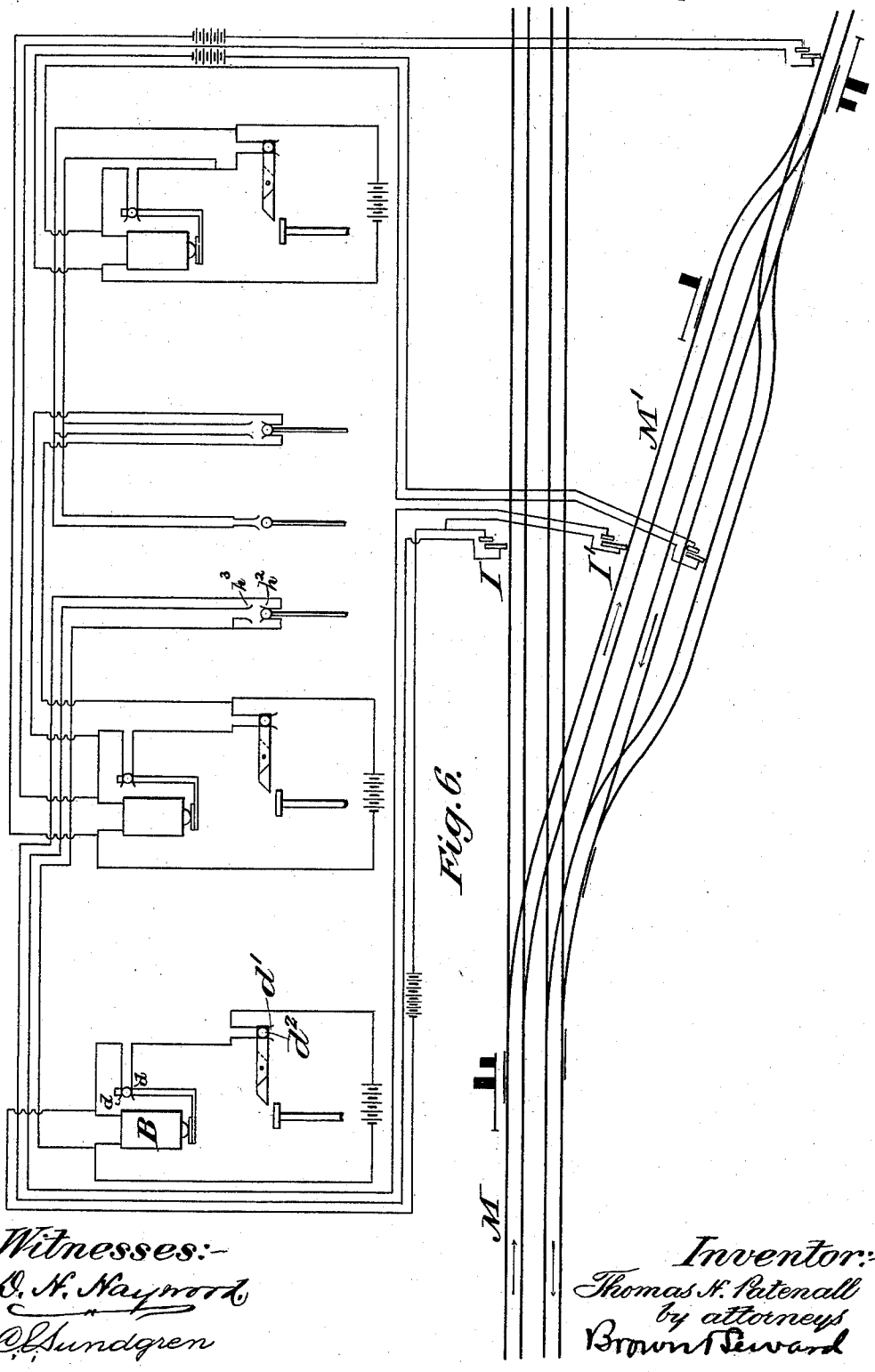

Fig. 6.

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UNITED STATES PATENT OFFICE.

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LOCKING DEVICE FOR SWITCH AND SIGNAL OPERATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 474,528, dated May 10, 1892.

Application filed January 2, 1892. Serial No. 416,775. (No model.)

To all whom it may concern:

Be it known that I, THOMAS H. PATENALL, of Rahway, in the county of Union and State of New Jersey, have invented a new and useful Improvement in Locking Devices for Switch and Signal Operating Mechanisms, of which the following is a specification.

My invention relates to an improvement in a locking device for use in connection with switch and signal operating mechanism, with a view to preventing the possibility of changing the switch and route after it is once set and signal given to proceed until the train has responded to the meaning of such signal.

A practical embodiment of my invention is represented in the accompanying drawings, in which—

Figure 1 is a top plan view of the locking device. Fig. 2 is a view of the same in side elevation, one side of the casing being removed. Fig. 3 is a view in vertical transverse section on the line $x\ x$ of Fig. 1. Fig. 4 is a view in end elevation of switch and signal operating mechanism, showing the connection in which the locking device is used. Fig. 5 is a view of the same in front elevation, the operating levers and parts immediately connected therewith being omitted; and Fig. 6 is a diagram illustrating a portion of a system of switch and signal operating mechanism in connection with main and branch tracks for the purpose of more clearly indicating the operation of the locking device.

The locking device forming the subject-matter of my present application is intended to be operated after the switch has been thrown and the facing-point lock and detector-bar adjusted and immediately before the signal has been set. In order to show its effect upon the system as a whole in connection with the mechanism with which it is intimately connected, I have shown such parts of the system as are immediately affected thereby, and will refer to so much of the same as is consistent with a clear explanation of the operation and effect of the locking device itself.

In making use of the term "facing-point lock and detector-bar" I refer to a well-known device for locking the sharp thin end of a switch-rail in its position snugly against the main rail when the switch is thrown, and commonly consisting of a sliding bar worked by a lever in the switch-tower.

The mechanism constituting the locking device may be conveniently inclosed within a suitable casing A, here shown as of oblong rectangular form, and consists of the following parts: An electro-magnet B depends from and is secured to a bracket c, fixed to a standard C, and its armature b is carried by a short arm b' of an angle-lever, the long arm b^2 of which is provided at its upper end with an insulating-piece b^3. An electric circuit maker and breaker b^4 consists in the present instance of a screw passed through and secured to the insulating-piece b^3. The angle-lever to which the armature is secured is pivotally mounted in a suitable support c'. A pair of contact-pieces d, consisting of outwardly-flaring spring-jaws, are secured to the upper end of the standard D in such position relatively to the circuit maker and breaker carried by the long arm b^2 of the angle-lever that when the armature is drawn toward the magnet the circuit maker and breaker b^4 will engage the faces of the two contact-pieces d and complete the electric circuit through them; but when the short arm b' of the said angle-lever is allowed to fall away from the magnet C such movement will swing the long arm b^2 of said lever so as to throw the circuit-breaker b^4 out of contact with the jaws d, and hence break the circuit through them. A sliding bar E is mounted so as to have a limited longitudinal sliding movement back and forth in proximity to the long arm b^2 of the angle-lever, and is provided with a notch e, so located that when it is in front of a nose b^5 on the arm b^2 and the said arm allowed to move away from the jaws d to break the circuit therethrough the said nose b^5 will engage the recess e in the sliding bar E and lock the latter against longitudinal movement. For the purposes of my present invention such position of the notch e will take place when the bar E is slid outwardly into the position shown in Fig. 2. The position of said bar when at the opposite end of its movement or thrust inwardly is represented by dotted lines in said figure. For convenience in operating the bar E, I provide a handle e', secured to a short extension e^2, the latter pivotally secured at one end of the bar E, as shown at e^3, and its opposite end

provided with a lip e^4, overlapping the upwardly-extending lug or projection e^5 on a supporting-piece fixed to the casing.

The angle-lever F is pivotally secured to a suitable support within the casing at f, one of its arms having a loose connection with the stud e^6 on the sliding bar E, and the other arm connected with an operating-rod f' leading downwardly to another angle-lever F', (see Fig. 5,) by which a sliding key f^2 is operated to release the signal-operating bar and at the same time to lock the facing-point lock and detector-bar lever, as will hereinafter be more particularly referred to.

The electric circuit through the magnet B and the wires b^6, leading therefrom, is completed through a local battery (see diagram, Fig. 6) and a second pair of contact-pieces d' and circuit maker and breaker d^2 (see same figure) whenever the circuit maker and breaker b^4 is in contact with the jaws d, and the energizing of the magnet B tends to hold the arm b' of the angle-lever in such position as to keep the circuit closed.

For convenience in explanation I shall call the electric circuit which I have just described as a "local circuit," and the circuit which I will hereinafter describe, leading through the same magnet B to a treadle at the side of the track I shall call the "treadle-circuit."

The locking mechanism which I have hereinabove partially described is intended to be located above the levers which operate the switch, the facing-point lock and detector-bar and signal within convenient reach of the operator. Its relative position to such levers is represented in Figs. 4 and 5.

The levers for operating the facing-point lock and detector-bar and signal may be of any ordinary or approved form. I have shown herein in Fig. 4 a lever G, provided with a spring-actuated dog g for locking the lever G at the limits of its forward and backward strokes, and have shown as connected with the lever a vertically-sliding bar H, the function of which is to release the facing-point lock and detector-bar lever and permit it to be operated after the switch has been thrown. In connection with this bar H, I have also shown bars H' and H^2 as three of the bars forming a set in a general system located in a single tower, the bars H' and H^2 being respectively connected with operating-levers, such as G, for operating the facing-point lock and detector-bar and the signal. In connection with the bar H there is a rod h, the head h' of which is adapted to complete an electric circuit through either one of two sets of contact-pieces, (represented by h^2 and h^3,) according to the position of the bar H. The contact-pieces h^2 are supposed to be in circuit with a treadle at the side of the track and the contact-pieces h^3 are presumed to be in connection with another treadle at the side of another track. In the present instance I shall assume that the contact-pieces h^2 are in circuit with the treadle denoted by I, Fig. 6, and the contact-pieces h^3 in circuit with the treadle I' of the same figure. The adjacent sides of the bars H and H' are provided with V-shaped notches, as is common, and so located with respect to one another that the bar H' remains locked by the key h^4 until the bar H has been lifted to bring the notch in it opposite the key h^4, and thereby permit the key to be slid to release the bar H'. The adjacent sides of the bars H' and H^2 are provided with recesses, the opposite sides of which are parallel, and the key f^2, hereinbefore referred to, is provided with tongues adapted to fit within such recesses and must be positively moved by means of the operating-rod f' and angle-lever F', in order to lock and release the bars between which it is located. The notch in the bar H' is so located in respect to that in the bar H^2 that the key f^2 can only be released from the bar H^2 after the bar H' has been lifted to set the facing-point lock and detector-bar to lock the switch. I also provide a double key h^5 which, when the bar H^2 is lifted, will be slid into V-shaped notches in the bars H and H' and effect a second locking of them. In connection with the bar H^2 there is a rod h^6, the upper end of which is adapted to engage a swinging portion k of the circuit maker and breaker d^2, the section k being so hinged to the body of the circuit maker and breaker that when the rod h^6 is lifted the section k will remain rigid with respect to its adjacent portion and will thereby swing the circuit maker and breaker d^2 out of engagement with the contact-pieces d', but when the rod h^6 moves downwardly the section k will swing and allow the rod to pass without effecting any breaking of the circuit.

The particular construction of the levers G and their connections with the bars H, H', and H^2, and with the switch facing-point lock and detector-bar and signal mechanism forms no part of my present invention, further than they become intimately connected with the locking device which I have set forth at length, and hence a further detailed description of them is omitted.

In order to show the practical operation of the locking device, I will suppose that a train is moving on the main track M in the direction of the arrow, Fig. 6, and that it is desired to switch it from that track onto the branch track M', same figure. First, the switch-lever G is drawn back to throw the switch, the movement of the dog g in connection with the throw of the lever serving to lift the bar H to bring its upper V-shaped notch opposite the key h^4, and at the same time lift the circuit maker and breaker h' into engagement with the contact-pieces h^3, thereby breaking the treadle-circuit through I and closing the treadle-circuit through I', so that when the train shall have passed onto the branch track M' it will by operating the treadle I' close the circuit through the mag-

net B and momentarily energize the same for the purposes which will hereinafter appear. Second, the lever for operating the facing-point lock and detector-bar is now swung, thereby lifting the bar H′ and sliding the key h^4 into the upper notch in the bar H, and thereby locking it in position and at the same time lifting its own parallel-sided recess into position opposite the key f^2. Third, the operator now slides the bar E of the locking device outwardly from the position shown in dotted lines to the position shown in full lines in Fig. 2, allowing the lip e^5 to hold it in extended position. Such sliding movement of the bar E operates the rod f' through the angle-lever F, and the rod f' in turn operates the angle-lever F′, in connection with the key f^2, and slides the lock into the notch in the bar H′, thereby locking the latter and hence the facing-point lock and detector-bar lever against displacement. The elevation of the bars H and H′ has brought the lower V-shaped notches therein up into position opposite to the noses of the double key h^5. Fourth, the switch-lever having been thrown and locked and the facing-point lock and detector-bar lever having been thrown and locked, the next step will be the setting of the signal to indicate to the engineer on the track M that the track M′ is ready for him to proceed. The operation of the signal-operating lever lifts the bar H^2, and with it the rod h^6, which, as it passes upwardly, momentarily breaks the local circuit through the contact-pieces d', and allows the short arm b' of the angle-lever, carrying the armature of the magnet, to fall away from the magnet, and hence throws the long arm b^2 of the said angle-lever into position to engage the notch e in the sliding-bar E, and hence lock the latter against displacement. Although this breaking of the local circuit has been but for a moment, it cannot be restored complete until the magnet has been energized from another source and the circuit maker and breaker b^4 again engaged with the contact-pieces d. Such energizing of the magnet takes place when the train reaches the treadle I′ upon the branch, and not until then. The elevation of the bar H^2 has carried the notch therein past the positively-operating key f^2, and has thereby prevented any possible movement of the facing-point lock and detector-bar lever until the bar h^2 shall have been again depressed by the changing of the signal.

To throw the switch again upon the main track M requires a simple reversal of the steps which have been herein set forth. The closing of the local circuit by the action of the train upon the treadle I′ has again released the bar E of the locking device, so that after the signal is changed to "danger" and the bar H^2 lowered, it may be again slid inwardly into the position shown in dotted lines, (shown in Fig. 2,) and the facing-point lock and detector-bar lever thereby released, so as to be operated to admit of the throwing of the switch.

What I claim is—

1. The combination, with switch and signal operating mechanism, of a device for controlling a positive lock in engagement with the said switch and signal operating mechanism, an electric circuit, including an electro-magnet, and a catch under the control of the electro-magnet to hold the aforesaid lock-controlling device released and under the control of the switch and signal operating mechanism to hold the lock-controlling device locked, substantially as set forth.

2. The combination, with a track, a treadle in position to be engaged by a passing train, and switch and signal operating mechanism, of a locking device for positively locking the switch and signal operating mechanism, the said locking device comprising an operating-bar, a catch for locking and releasing the bar, a local electric circuit, including an electro-magnet, for holding the catch out of engagement with the bar, and an electric circuit through the said electro-magnet and the aforesaid treadle for energizing the magnet and operating the catch by means of a passing train, substantially as set forth.

3. The locking device comprising the sliding operating-bar, means for connecting it with the lock-operating rod, the electro-magnet, the lever carrying the armature of the magnet and adapted to engage the sliding bar, and the electric circuit through the magnet and through a circuit maker and breaker controlled by the lever which carries the armature of the magnet, substantially as set forth.

4. The locking device comprising the sliding operating-bar, means for connecting it with a lock-rod, an electro-magnet, an angle-lever, one arm of which carries the armature of the magnet, the opposite one of which has an interlocking engagement with the sliding bar, a circuit maker and breaker insulated from and carried by an arm of said lever, and an electric circuit through the magnet and contact-pieces in position to be engaged by the said circuit maker and breaker, substantially as set forth.

5. The combination, with a movable part under the control of the switch and signal operating mechanism, of the locking device and a locking-piece under the control of said locking device, the said locking device comprising an operating-bar, an electro-magnet, a lever, a circuit maker and breaker carried by said lever, a circuit maker and breaker under the control of the aforesaid movable part, and an electric circuit complete through said magnet and the two circuit makers and breakers, substantially as set forth.

THOMAS H. PATENALL.

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