(No Model.) 2 Sheets—Sheet 1

T. A. B. PUTNAM.

ELECTRIC SAFETY APPLIANCE FOR RAILWAY SWITCHES, &c.

No. 258,601. Patented May 30, 1882.

Fig. 1.

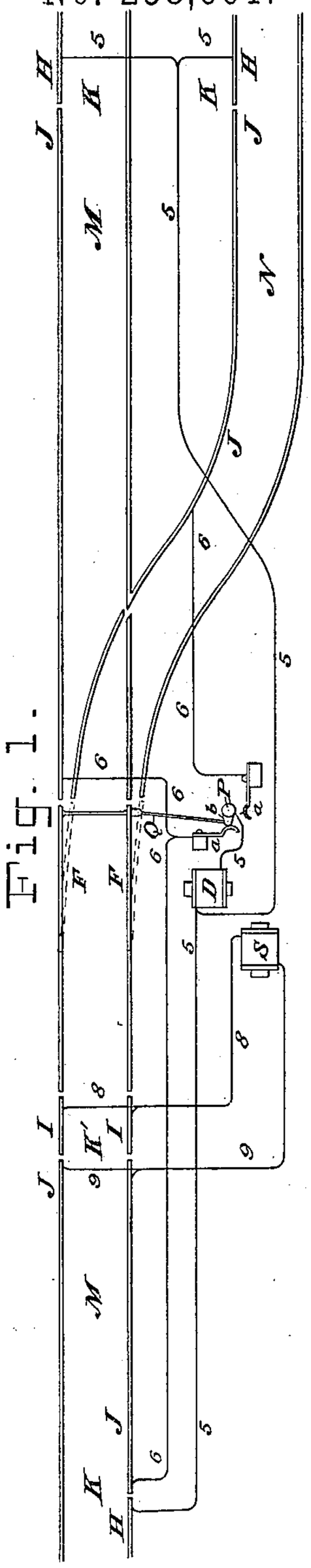

Fig. 4.

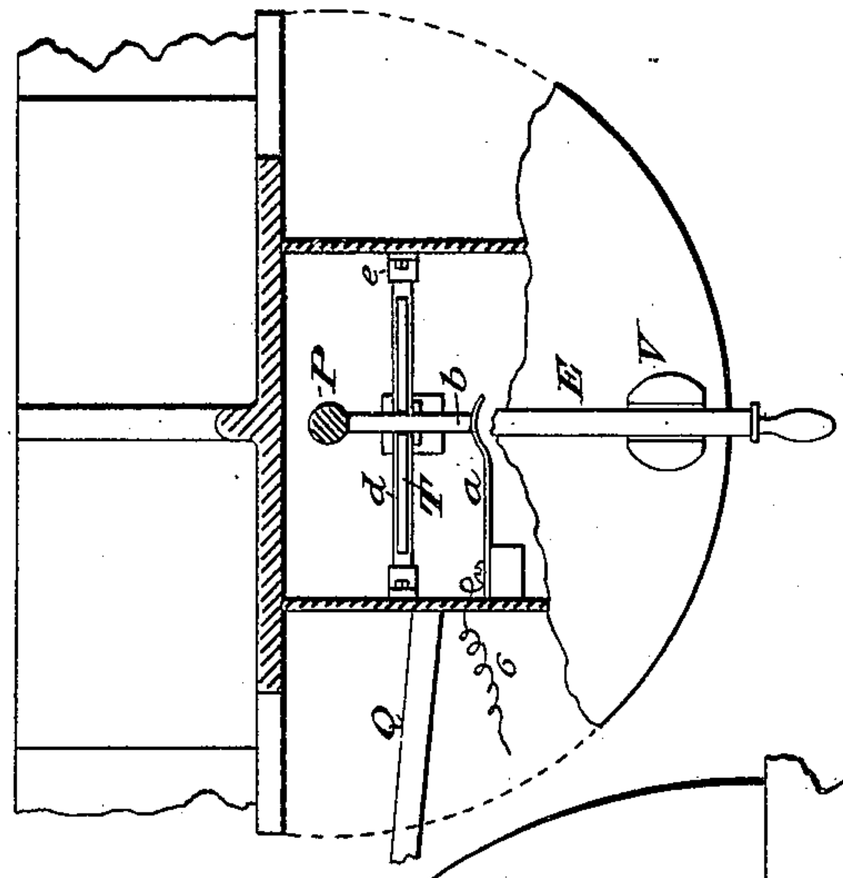

Fig. 3.

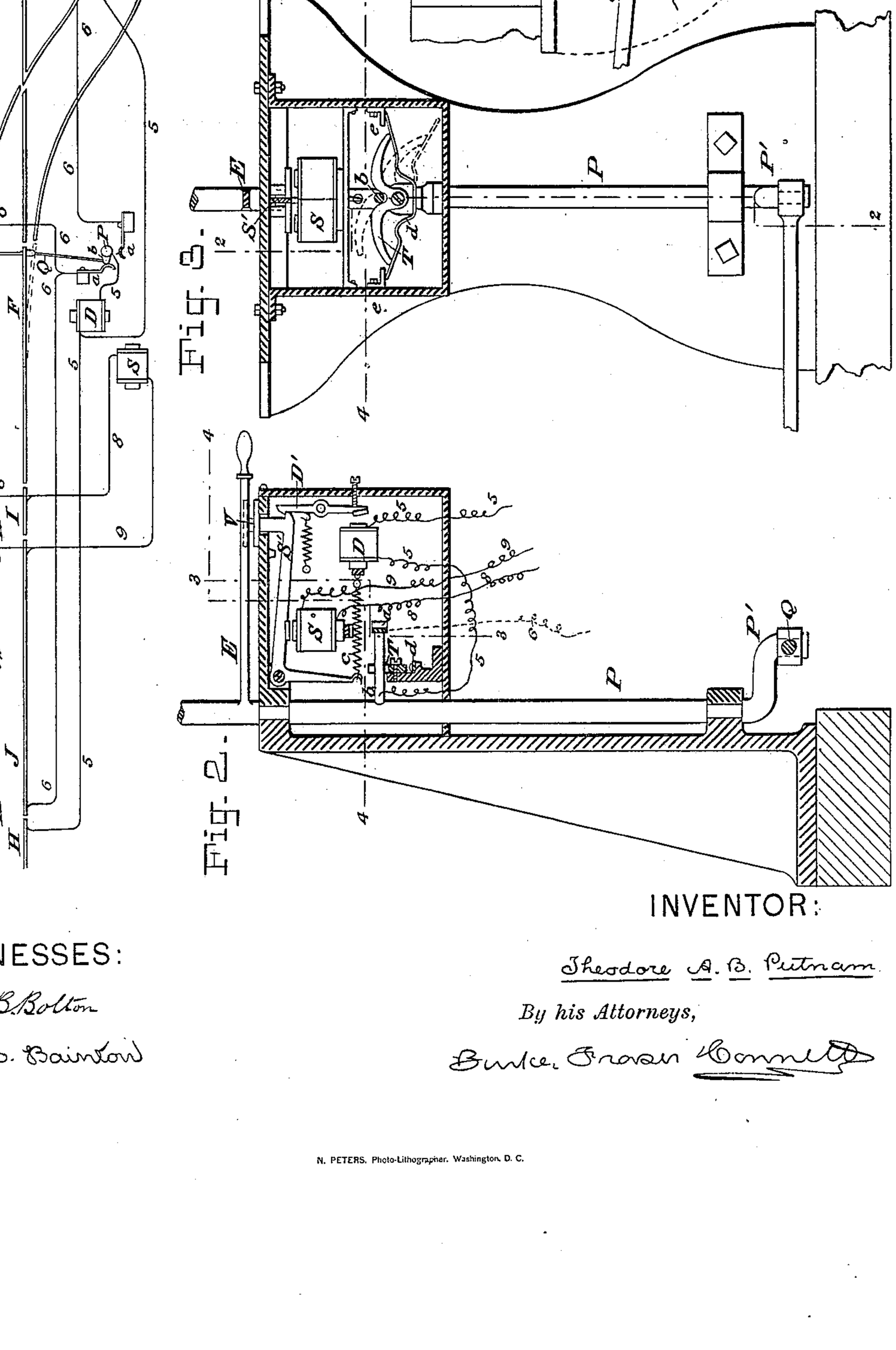

Fig. 2.

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INVENTOR:

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(No Model.) 2 Sheets—Sheet 2.

T. A. B. PUTNAM.

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Fig. 6

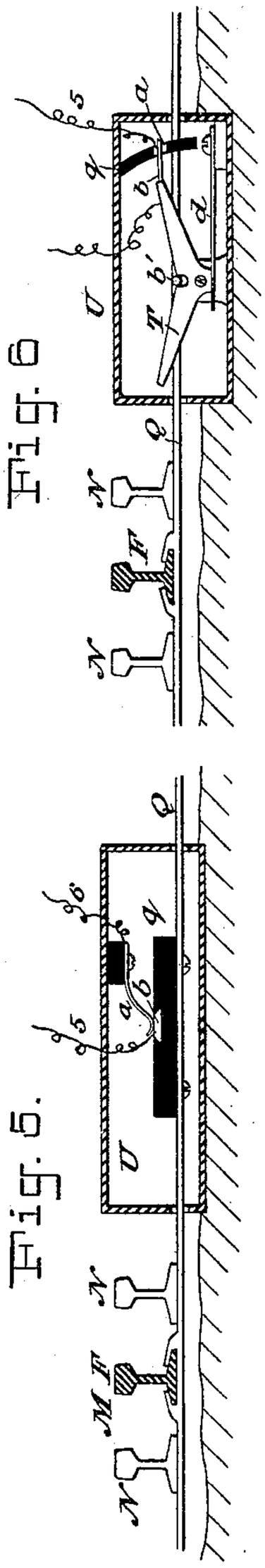

Fig. 7.

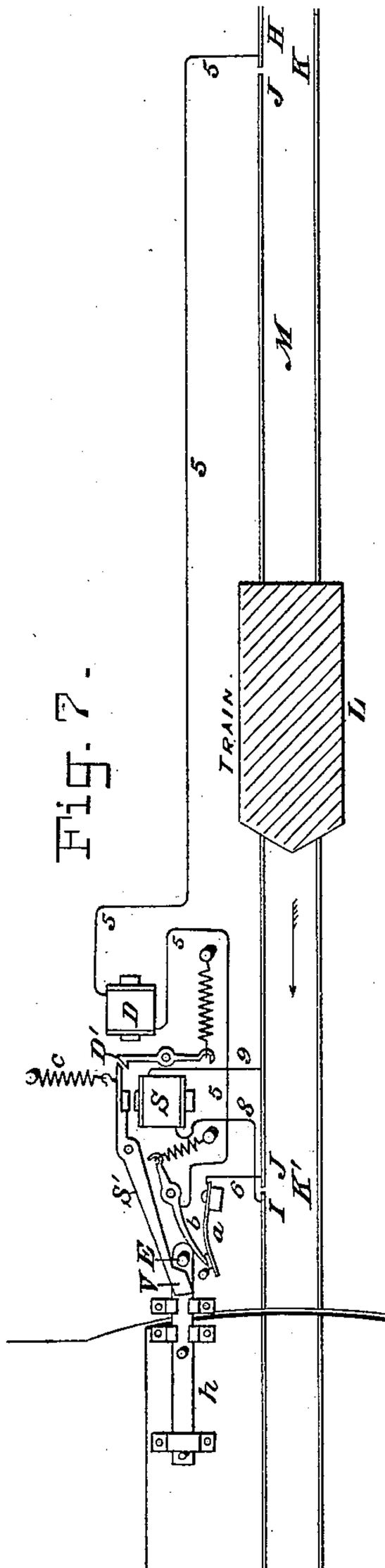

Fig. 8.

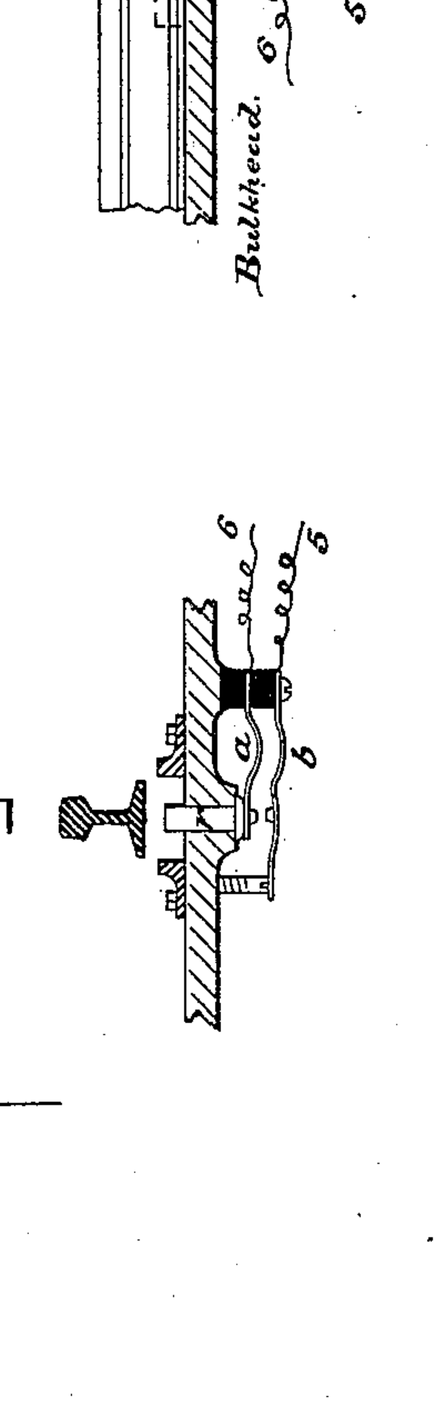

Fig. 5.

Fig. 9.

INVENTOR:

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UNITED STATES PATENT OFFICE.

THEODORE A. B. PUTNAM, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE RAILWAY CAB ELECTRIC SIGNAL COMPANY, OF SAME PLACE.

ELECTRIC SAFETY APPLIANCE FOR RAILWAY-SWITCHES, &c.

SPECIFICATION forming part of Letters Patent No. 258,601, dated May 30, 1882.

Application filed June 17, 1881. (No model.)

To all whom it may concern:

Be it known that I, THEODORE A. B. PUTNAM, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Electric Safety Appliances for Railway-Switches, &c., of which the following is a specification.

This invention is in the main an improvement upon my Patent No. 243,619, dated June 28, 1881, for electric danger-alarms for railways.

In the accompanying drawings, Figures 1 to 5 show my present invention as applied to a railway-switch, and Figs. 6 to 8 show it as applied to a draw-bridge.

I will first describe the switch.

Fig. 1 is a plan of a switch on a single-track railway with my electrical appliances in diagram. Fig. 2 is a vertical mid-section of a switch-shifting apparatus provided with my invention, taken in the plane of the line 2 2 in Fig. 3. Fig. 3 is a front elevation thereof, partly in section, taken in the plane of the line 3 3 in Fig. 2; and Fig. 4 is a plan thereof, partly in horizontal section, on the line 4 4 in Figs. 2 and 3.

Referring to these figures, M M′ is the main track. N is the branch track, and F F are the switch rails.

P is the usual vertical switch-shifting shaft, having a radial handle, E, and a crank, P′, which connects by a rod, Q, with the switch-rails F F. I fix a radial conducting-arm, *b*, to the shaft P, and provide a fixed spring, *a*, to make contact with it when the switch is set to the main line, as shown in Figs. 2 and 4, and I may also arrange another spring, *a*, to make contact with the arm *b* when the switch is set to the branch track N, as shown in Fig. 1. A divided signal-disk, V, Figs. 2 and 4, is mounted on the end of the armature-lever S′ of an electro-magnet, S, which lever is acted on by a spring, *c*, so that the disk tends to fly up in the way of the handle E, as shown in dotted lines in Fig. 2, so as to embrace the handle between its halves. When drawn down by the magnet S, as shown, it is caught by a spring-catch lever, D′, which bears the armature of a magnet, D, so that when this magnet is excited the catch is withdrawn.

On each track M, M′, and N, some distance from the switch, is a signaling-point, K, where two adjoining track-rails, H and J, are insulated from each other. A wire, 5, leads from each rail H to the magnet D and thence to the arm *b*, and another wire, 6, leads from each rail J to a spring, *a*. The wires 6 6 from the rails J J of the main track M *m′* both lead to the spring *a* shown in Figs. 2 and 4, and if a signaling-point, K, is placed on the track N the wire 6 therefrom leads to an additional spring *a*, so placed that the arm *b* will make contact with it when the switch is set to the track N. Thus from each point K there is a partial electric circuit, 5, D, 5, *b*, *a*, and 6, which terminates in the rails H and J, and which may be broken at *a b*.

At or near the switch on the main track M, by preference, there is another signaling-point, K′, where two adjoining rails, I and J, are insulated from each other. The rail I connects by a wire, 8, with the magnet S, and the latter connects with the rail J by a wire, 9. A partial circuit, I 8 S 9 J, is thus formed.

To understand the operation of my invention a reference to my said previous patent will be necessary. Fig. 1 of that patent shows a locomotive bearing an incomplete electric circuit terminating in two rail-conductors, one arranged in advance of the other, and both in contact with the same rail, so that the circuit is normally completed through the rail. That circuit includes a generator of the electric current and an electro-magnet, which, when excited, restrains the alarm from operating. Whenever the circuit is broken the magnet releases the alarm, which operates and denotes danger. To break the circuit and give the alarm it is necessary to insulate two adjoining rails from each other, so that in crossing this insulation the rail-conduction between the terminals is interrupted. A locomotive thus provided is to be used with my present invention, and with the arrangement shown in Fig. 1 its rail-conductors should be arranged on its right-hand side.

The operation is as follows: With the switch set as shown in Fig. 1 a locomotive approaching the switch on the track N will receive a danger-alarm when its terminal rail-conductors straddle the insulation between rails H and J, since the partial circuit H, 5, D, 5, *b*, *a*, 6, and J is broken at *a b*. A locomotive approaching on track M or M′ will receive no alarm, since when its rail-conductors are bridging the insulation the partial track-circuit (which is not broken at *a b*) and the partial locomotive-circuits are merged into one and the latter is not broken. The current then flows from one locomotive terminal, through H, 5, D, 5, *b*, *a*, 6, and J, back to the other locomotive terminal. The circuit in flowing through magnet D excites it and withdraws the catch D′, which releases the lever S′, which flies upward with its disk V. If now the switchman should attempt to shift the switch, he would find the turning of the handle E obstructed by the disk V, and he would thereby know that a train was approaching. If, however, as sometimes happens, it is necessary for him to shift the switch before the train passes, he can first press down the disk V with his finger, when it will be again held by the catch D′. If he does not depress the disk then, when the locomotive reaches the signaling-point K′ its partial circuit is merged with the partial circuit I 8 S 9 J, and the magnet S is excited and draws down the lever S′ and the disk to the position shown. Thus, if the switch be misplaced the engineer will receive a danger-alarm when he is far enough away to stop his train before reaching the switch; but if the switch be properly set the engineer receives no alarm, and the switchman is notified that a train is approaching in such manner that he cannot shift the switch while the train is between the signaling-point and the switch without first unlocking his apparatus.

The signaling-points K K have rails insulated from each other on but one side of the track—at the right hand of a person facing the switch; but at the signaling-point K′ the rails are insulated on both sides of the track. This is the arrangement for a single-track road. That for a double-track road will be obvious.

Automatic switch-locks as heretofore made lock by gravity when a restraining electro-magnet becomes demagnetized, this magnet being normally excited by a current from a battery interposed in a circuit leading to a remote semaphore placed at the side of the track, which semaphore acts as a relay to open or close the locking-circuit. The semaphore is itself actuated by its magnet being included in another circuit, energized by a battery, extending to the switch, and there short-circuited, if the switch be misplaced, and including the opposite rails of the track, whereby the bridging of these rails through the wheels and axles of a passing train short-circuits the semaphore-circuit. The semaphore moves to "danger" when the switch is shifted from the main line when any defect occurs in its circuit, and when a passing train reaches the rails included in its circuit; and at each of such times the switch-lock descends, so as to lock the switch in its normal position. It will be observed that my arrangement employs but one circuit leading from the remote signaling-point, and requires no battery in this circuit; that the switch is locked by an instantaneous electrical impulse, remaining then locked until it is unlocked by another impulse or by hand; that the "lock," so called, is not an absolute lock or fastening, but a mere obstruction, designed to call the switchman's attention to the fact that a train is approaching, and require him to execute the act of removing the obstruction before he can shift the switch; and that combined with the lock is a visual signal which, when elevated, denotes to the switchman that a train is approaching. My lock does not depend for its operation on the action of a remote signal; nor does the switch become locked in case of a defect in the track, or in any electric circuit, as in such case it is desirable only to warn the engineer of the train, which my system fully accomplishes.

As the locking and signaling disk V and its operating-lever S′ must be very light in order to be actuated by the electro-magnets S and D, I provide means, which I will now describe, for relieving it of nearly all strain in case the switchman attempts to shift the switch while the disk is up.

T is a locking lever or latch, having just above its fulcrum a notch or socket for the reception of the arm *b*. From this socket its two arms or wings curve upwardly, outwardly, and somewhat downwardly, and their ends are engaged by the ends of a centrally-confined leaf-spring, *d*, or other suitable form of spring. When the switch is set to the main track the arm *b* is in the socket of the lever T, as shown in Figs. 2, 3, and 4, and both arms of said lever are in contact with the spring, whose ends are also in contact with fixed stops *e e*, (shown in Figs. 3 and 4,) which prevent their moving farther up. The action of the spring *d* is to keep the lever T in the position shown, and the action of the lever is to confine the arm *b* and render the application of considerable force necessary to shift the switch, since to extricate the arm it is necessary that the latter by its forcible lateral or vibratory movement shall tilt the lever T into the position shown in dotted lines, thereby deflecting one arm of the spring, as shown. As the socket in the lever T is close to its fulcrum and the spring bears upon the ends of the lever, the arm *b* acts at a great mechanical disadvantage in tilting the lever to escape therefrom. In returning from either lateral position to its central position the arm *b* first strikes the end of the lever and acts upon the gradual incline of its arm to better advantage than upon the abrupt walls of its socket, so that the switch may be returned to the main

line with comparative ease. This lever T is adjusted to offer so much resistance to the shifting of the switch that the latter cannot be shifted suddenly or with a jerk, which would be apt to injure or break the disk V or its lever. The lever T may be used independently of my electric signaling appliances where an automatic lock or latch to prevent accidental displacement of the switch is desired.

Figs. 5 and 6 show two modifications of the switch appliances. Both views are vertical sections cut transversely of the track in the plane of the rod Q. Fig. 5 shows a modification of the circuit-breaking device *a b*. A box, U, is set over the bar Q near the switch-rails, and to the bar Q is fixed an insulated contact-strip, *q*, and over this is a stationary contact-spring, *a*, connected to the wire 6. A conducting-plate, *b*, connected with the wire 5, is set in the contact-surface of the strip *q* in the position to contact with the spring *a* when the switch is set to the main line. When shifted to either side it moves (with the bar Q) beyond the spring *a*, so that contact between them is broken. Fig. 6 shows a similar arrangement of box U and rod Q. The latter bears a projecting arm, *b'*, instead of a contact-strip, and this arm is engaged by a locking-lever, T, the same as that before described, except that the arms thereof are long enough to keep in engagement with the arm *b'* at all times. The spring *d* acts on a squared boss of the lever T in similar manner to the back-spring of a pocket-knife upon the blade. On the end of one arm of the lever T is a contact-spring, *b*, which normally contacts with the conducting portion *a* of an otherwise insulated contact-strip, *q*. When the switch is shifted the lever T is tilted, and kept tilted, thus moving the spring *b* onto some insulated portion of the said strip *q*.

Figs. 7, 8, and 9 show the application of part of my present invention to a draw-bridge. Fig. 7 is a plan of a portion of the bridge and track, with my appliances shown in diagram. The track M has signaling-points K and K', the same as at the switch, and near the draw-bridge are electro-magnets D and S in circuit therewith, as described. The circuit-breaking device *a b* consists of a spring-lever, *b*, which, when the bolt *h* on the draw is thrust home into its socket on the bulk-head, is pressed back thereby into contact with a spring, *a*. Thus whenever the draw is unbolted the partial circuit to the point K is broken, so that the alarm will be sounded on an approaching locomotive. If the draw be closed and bolted, a signal will be displayed at the bolt as soon as an approaching locomotive passes the point K. This signal consists of a plate, V, which moves into the way of the bolt-handle E, as shown, so that should the bridge-man attempt to unbolt the draw his attention must be called to the signal; but the latter does not positively lock the bolt. If he must open the draw, he does it knowing that a train is coming, and will signal the latter in the usual manner, and in withdrawing the bolt the handle E presses back the plate V. Otherwise when the train reaches the point K' the plate will be electrically replaced. It is unnecessary to describe the electro-mechanical features of the signal, they being essentially the same as for the switch. The apparatus is designed to be incased, so that the plate V in its normal position is concealed.

Some draw-bridges are not fastened by bolts, but by extending the rails on the bridge beyond it onto the bulk-head and there confining them in sockets. To unlock the draw these rail ends are lifted or sprung up far enough to clear the sockets.

Figs. 8 and 9 are fragmentary views, showing a circuit-breaking device in connection with a bridge of this construction. Fig. 8 is a vertical cross-section, showing the rail lifted out of the socket; and Fig. 9 is a longitudinal section, showing the rail in the socket. A sliding pin, *r*, is placed in a vertical bore under the rail-socket and pressed upward by a contact-spring, *a*. When pressed down by the weight of the rail above it when the bridge is locked it presses down the spring *a* into contact with another spring, *b*, thereby closing the partial circuit 6 *a b* 5.

My invention may be wholly or in part applied to other structures or provisions on railways than those shown—as, for instance, to road-crossings, to railway-crossings on a level, and to railway stations or depots where it is desired that the approach of a train should be automatically denoted.

The signal V may be restored by mechanical means operated by the passage of the train, such as shown in my Patent No. 229,009, dated June 22, 1880, instead of by the electro-magnet S, if preferred.

I make no claim in this application to anything claimed in any of the patents herein mentioned; but

What I do claim, and desire to secure by Letters Patent, is—

1. The combination, with a railway-switch, draw-bridge, or similar structure or provision, of a visual signal disk or plate arranged adjacent to the operating-handle, and tending to move into the way thereof, an electro-magnetic detent arranged to normally restrain said signal, a partial electric circuit including said magnet extending to a distant signaling-point and there terminating in two adjacent and successive track-rails insulated from each other, and a circuit-breaking device, also included in said partial circuit, and so arranged in connection with the switch, bridge, &c., that the said partial circuit remains closed when said switch or bridge is properly set, and is broken when the latter is set to "danger," substantially as set forth.

2. A switch or draw-bridge locking device consisting of the combination of a partial circuit terminating in distant insulated rails H

J, an electro-magnet, D, included in said circuit, a detent-lever, D′, bearing the armature of said magnet, a lever, S′, bearing a locking device, V, tending to thrust the latter into engagement with the operating-handle, and normally restrained by said detent-lever, whereby an instantaneous electrical impulse through said circuit will cause the locking of the switch or bridge, and the latter will thereupon remain locked until the locking device is otherwise withdrawn, with automatic means for withdrawing said lock upon the passage of a train past a point on the track adjacent thereto, substantially as set forth.

3. The combination of operating-handle E, disk V, armature-lever S′, magnet S, a partial circuit including said magnet and terminating in two successive track-rails at a point adjacent thereto, the said rails insulated from each other, a withholding detent-lever, D′, bearing an armature, an electro-magnet, D, a partial circuit including said magnet extending to a remote point on the track, and there terminating in two successive track-rails, and the said rails insulated from each other, all constructed and arranged to operate substantially as set forth.

4. A railway-switch, draw-bridge, or other structure provided with an electro-magnetically-applied lock, in combination with a mechanical or spring latch adapted to always engage the operative mechanism when the structure is in the position of "safety," and to strongly resist any effort to move it out of that position, thereby relieving the electrical lock of more or less strain, substantially as set forth.

5. A railway-switch provided with an electro-magnetically-applied lock adapted to engage the operative mechanism when the switch is set to "safety," in combination with an automatic mechanical locking device consisting of a locking-lever, T, having a central recess near its fulcrum adapted to engage a moving part, *b* or *b′*, on the switch-shifting mechanism when the switch is set in its "safety" position, and having an arm or arms extended laterally of said socket for engagement with said part in its movement toward or from said socket, in combination with said part and with a spring or springs, *d*, arranged to cause the lever to resist the tilting movement necessary to the escape of said part from its socket, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

THEODORE A. B. PUTNAM.

Witnesses:

HENRY CONNETT,

ARTHUR C. FRASER.