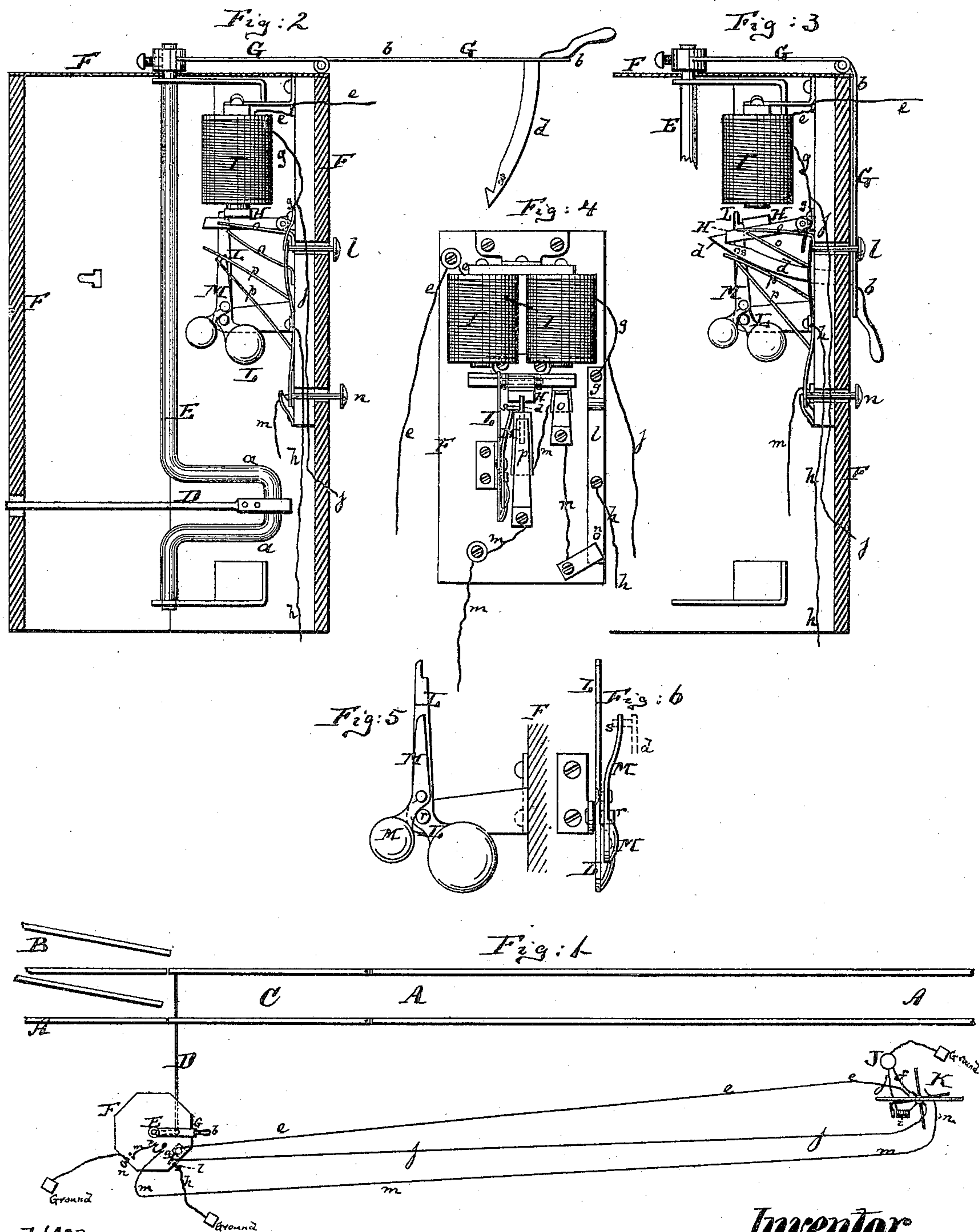


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ELECTRO-MAGNETIC RAILROAD SIGNAL AND SWITCH.

No. 172,503.

Patented Jan. 18, 1876.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN ELECTRO-MAGNET RAILROAD SIGNALS AND SWITCHES.

Specification forming part of Letters Patent No. **172,503**, dated January 18, 1876; application filed December 7, 1875.

*To all whom it may concern:*

Be it known that I, DAVID ROUSSEAU, of New York city, in the county and State of New York, have invented a new and Improved Electro-Mechanical Railroad-Switch and Draw-Bridge Apparatus, of which the following is a specification:

This invention has for its object to produce a reliable switch and draw-bridge lock, which can only be opened after a signal, interposed between a possibly approaching train and the switch or draw-bridge, has been set to indicate "danger," and so that the switch or draw-bridge can only be opened after the lock has been affected in the manner above indicated.

The invention consists, principally, in locking the lever, by which alone the switch or draw-bridge can be set, by an armature-lever in a closed box or case, so that it cannot be withdrawn to set the switch or draw-bridge unless the said armature-lever is first attracted to its electro-magnet.

The invention consists, secondly, in placing said electro-magnet in a circuit which includes a distant signal, so that the circuit cannot be closed unless said distant signal is first set at "danger."

The invention further consists in placing the actuating mechanism of said distant electric signal into a circuit leading to the box or case that locks the aforementioned lever, so that said distant signal can only be set at "danger" by pressing a key at such box or case; and when so set at "danger" the said signal is instrumental in closing the circuit through the electro-magnet placed in such box or case, whereupon the armature is attracted and the lever released. The attendant is now at liberty to open the switch or draw-bridge, and meanwhile any approaching train will be duly warned by the danger-signal.

The invention also consists in leading the conductor—through which, after the reclosing of the switch or draw-bridge, the signal can be reset to "safety"—into said box or case; and in so interrupting it within said box or case that a current can only be sent through it after the said lever has been reinserted and the armature-lever dropped off the electro-magnet, said lever reinserted and armature dropped off the magnet serving to close the

breaks or interruptions in the conductor. Therefore the distant signal must remain at "danger" until the attendant has reset the switch or draw-bridge, and relocked the same. A reliable check is thus placed on the operator, and at the same time the safety of trains guaranteed. The operator cannot leave the switch or bridge neglectfully open, as that would leave the signal at "danger," and cause speedy detection of his negligence. Nor can he, after reclosing the switch or bridge, leave the operating-lever unlocked, as that, too, would leave the distant signal at "danger," and cause speedy detection of his conduct; yet, after he has locked the lever, he cannot unlock it from the armature-lever without first setting the signal at "danger."

The invention also consists in further details of mechanism for holding the armature to the electro-magnet and for disengaging it, and other features of improvement hereinafter more fully described.

Figure 1 in the accompanying drawing is a diagram, showing the relative position of my apparatus to the electric conductors and signal employed in conjunction with the same. Fig. 2 is a vertical transverse section of the box or case containing the locking mechanism, showing the lock opened. Fig. 3 is a similar view of the same, showing it closed. Fig. 4 is an inner face view of the same. Fig. 5 is a detail side view of the double-balanced lever used for holding the armature elevated. Fig. 6 is an edge view of the same.

Similar letters of reference indicate corresponding parts in all the figures.

A represents the main track, B the branch track, and C the connecting-switch, of a railroad. The drawing shows the apparatus connected with a switch; but it is evident that the locking-key or other device of a draw-bridge may be used, with reference to the invention, in substantially the same relation as the switch. D is the rod which connects the switch with the crank *a* of a shaft, E, so that by turning said shaft the switch can be moved in line with the main or with the branch track, as may be desired. The shaft E is almost entirely inclosed within a box or case, F, to the interior of which access is not to be had in ordinary cases, though it should have a locked



door, to allow inspection, repair, &c., of its contents.

The shaft E can only be turned to set the switch by a jointed lever, G, which is rigidly attached to it, outside of or above the box or case, as shown, and whose handle part *b* is hinged to the rigid part, as shown. From the handle part *b* of the lever G projects a notched arm, *d*, which, when the switch is in line with the main track, as in Fig. 1, can be swung through a hole into the interior of the box or case F, as clearly shown in Fig. 3. When thus carried into the box the arm *d* arrives under an armature-lever, H, which drops into the notch of said arm, as in Fig. 3, and thereby locks it in the box or case. The lever G is thus locked, and with it the shaft E and switch C, and the latter cannot be moved unless the armature H is first raised off the arm *d*, and the latter withdrawn from the box F, as in Fig. 2. I is an electro-magnet, placed over the armature-lever H, and joined by a conductor, *e f*, to a battery, J, and by a conductor, *g h*, to the ground. A break in the conductor *e f* is near a distant signal, K, and can only be closed when said signal is turned to "danger."

The signal which I intend to usually employ in conjunction with this apparatus is of substantially the same construction as is described in the Letters Patent, No. 166,559, granted me August 10, 1875. and is, in Fig. 1 of the drawing, represented to be set at "safety"—*i. e.*, with its face parallel to the track. In this position its operative electro-magnet *i* is in metallic connection with a conductor, *j*, which leads to the box F and joins the wire *g*. By a pressure upon a key, *l*, at the box F the ground-wire *h* can be brought in contact with the conductor *j*, thus establishing the circuit through the electro-magnet *i* and battery J, and if afterward the signal has been set to "danger," and has closed the break in the conductor *e f*, the continued pressure on the key *l* will cause a current to pass from the battery over the wires *f e* to the electro-magnet I of the box F, and thence, via the conductors *g h*, to the ground. Upon being charged with electricity the electro-magnet I attracts the armature H, and draws it off the arm *d* of the lever G. A weighted lever, *l*, pivoted in the box F, is by its gravity swung under the armature H as soon as it is attracted to its electro-magnet I, and holds said armature against said electro-magnet, even after the current by which the armature was attracted has been interrupted. The signal K, when set at "danger," causes its electro-magnet *i* to come into metallic connection with a conductor, *m*, which leads to the box F, and which has three breaks in said box, of which one can be closed by a key, *n*. The other two breaks or gaps are formed by two pairs of springs, *o o* and *p p*. The springs *o o* are under the armature H, and are brought in contact with each other when said armature has dropped off its electro-magnet I, as in Fig.

3. Otherwise—that is, when the armature H is raised—the springs *o o* are apart, as in Fig. 2. The other two springs *p p* are closed together by the arm *d* when the same is inserted into the box F, as in Fig. 3. Otherwise they are apart, as in Fig. 2. To the weighted lever L is pivoted a shorter weighted lever, M, as in Figs. 5 and 6, whose lower part bears against a pin, *r*, that projects from the lever L, or from the support thereof. When the arm *d* is introduced into the box F the lever L being beneath the armature H, a pin, *s*, on the arm *d* strikes the lever M, and vibrates it, causing the same to strike the pin *r*, and thereupon to swing the lever L away from under the armature, so that the latter may drop into the notch of the arm *d*, as in Fig. 3.

The operation is as follows: The switch being in line, the lever G locked by the armature H, and the signal K set at "safety," all as in Fig. 1, the operator, if he desires to set the switch in line with the branch track, must first touch the key *l*, and establish a current through the electro-magnet *i* of the signal. This will cause the signal to be set at "danger," and the conductor *e f* to be perfected, and a circuit established through the electro-magnet I in the box, the operator pressing on the key *l* until the armature H is raised by the electro-magnet. The arm *d* is now released, and can be withdrawn from the box, and the shaft E can be turned to set the switch in the required manner. The signal meanwhile remains at "danger." When the switch is subsequently reset in line with the main track, the signal still remains at "danger" until after the arm *d* has been reinserted into the box. This causes the break *p p* in the conductor *m* to be closed; and as, by the introduction of the arm *d*, the armature H is caused to drop off the electro-magnet I, the break *o o* in the conductor *m* is also closed; but the arm *d* meanwhile also safely locked. A touch upon the key *n* will now establish a current through the conductor *m* and magnet *i*, and cause the signal to be reset at "safety." Thus it will be seen that a complete check is obtained on the action of the switch-tender, and at the same time absolute protection guaranteed the trains.

The arrangement of the several parts hereinabove specified may be varied, especially the arrangement of conductors hereinabove referred to without departing from the spirit of my invention. The conductor *m* may, if desired, be made without the combination with a key, *n*, so that the signal be reset at "safety" automatically, when the lever-arm *d* is reinserted; and the breaks *o p* in the conductor *m* may be omitted, or either of them, if desired. Other variations, too manifold to be here separately pointed out, may be made in the several parts referred to in the specification, and yet the double check on the attendant and train-conductor obtained, which is, indeed, the principal feature of my invention.

I claim as my invention—

1. The switch-lever G, combined with the



box F, and with the armature H therein, to be locked by said armature, substantially as specified.

2. The combination of the electro-magnet I within the switch-box F with the distant signal K, and the uniting conductors, in such manner that the current through the magnet I is established when said signal is set to "danger," as specified.

3. The combination of the lever G, electro-magnet I, and the locking-armature H, with the box F, conductors *j f e*, and signal *k*, substantially as herein shown and described.

4. The combination of the signal K with the releasing-conductor *m*, which has one or more breaks, *o p*, and with the switch-box F, within which said breaks are concealed, substantially as herein shown and described.

5. The combination of the armature H with the lever-arm *d*, and with the conductor *m* having the break O, said break to be closed

when the armature locks the arm *d*, substantially as specified.

6. The combination of the lever-arm *d* with the receiving-box F, and with the conductor *m* having the break *p*, substantially as described, said break to be closed when the arm *d* is inserted within the box, substantially as specified.

7. The combination of the balanced lever L with the armature H, and with the switch-lever, which is locked by said armature, substantially as specified.

8. The lever M, combined with the lever L, and with the arm *d* of the switch-lever, substantially as specified.

The foregoing description of my invention signed by me this 4th day of December, 1875.

DAVID ROUSSEAU.

Witnesses:

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A. MORAGA.