

No. 623,444.

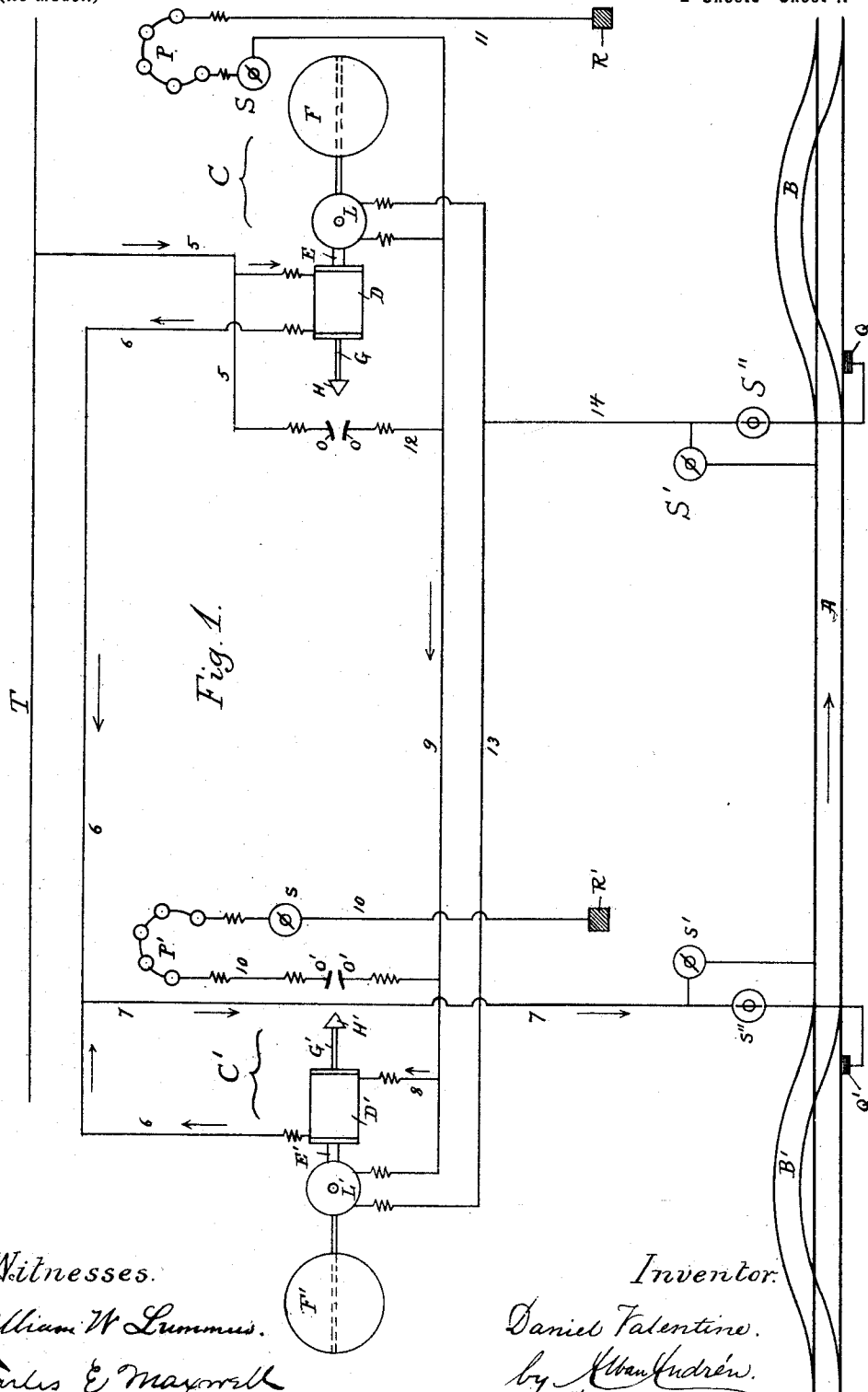
Patented Apr. 18, 1899.

D. VALENTINE.
ELECTRIC RAILWAY SIGNALING DEVICE.

(Application filed Sept. 23, 1898.)

2 Sheets—Sheet 1.

(No Model.)



Witnesses.

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Charles E. Maxwell

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2 Sheets—Sheet 2.

Fig. 3.

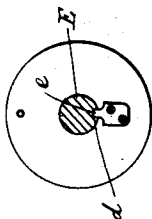


Fig. 4.

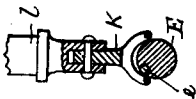
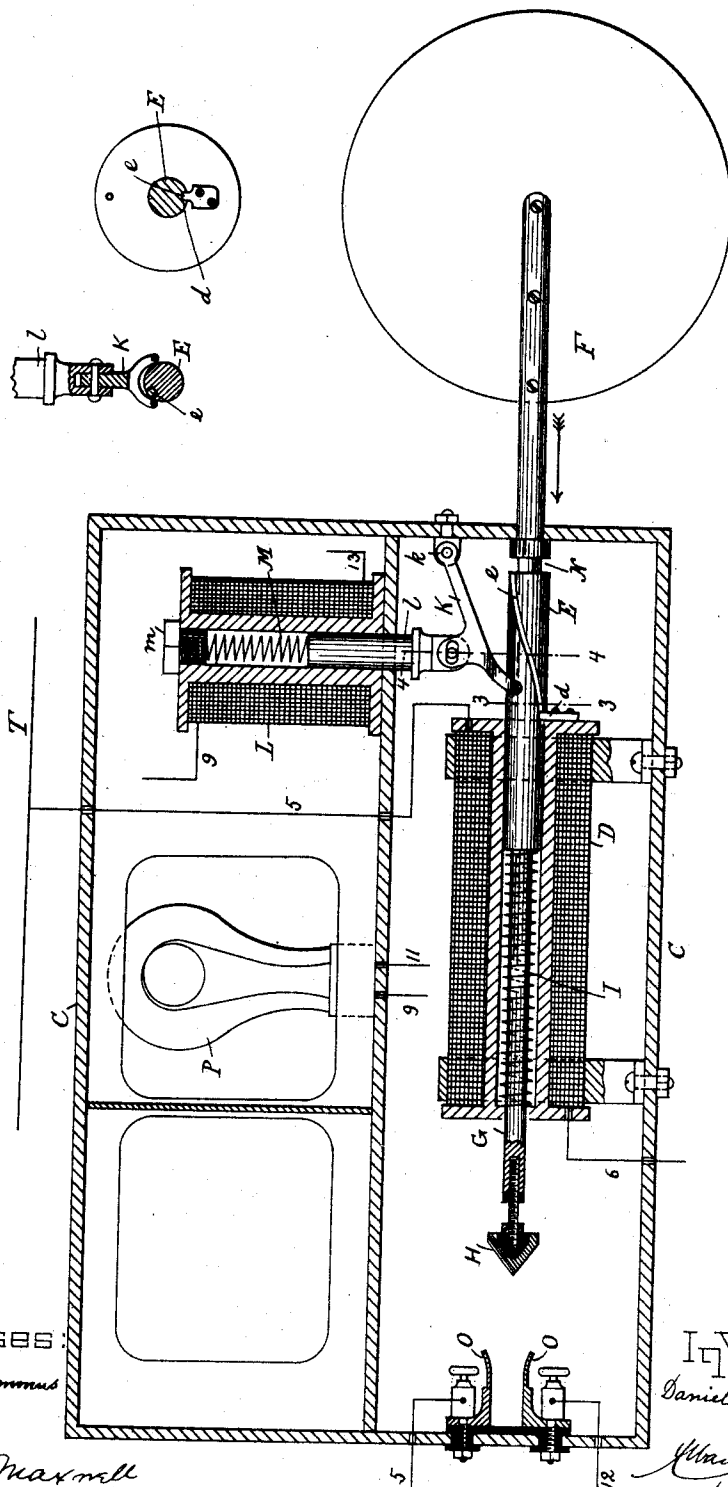


Fig. 2.



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UNITED STATES PATENT OFFICE.

DANIEL VALENTINE, OF BROCKTON, MASSACHUSETTS.

ELECTRIC RAILWAY SIGNALING DEVICE.

SPECIFICATION forming part of Letters Patent No. 623,444, dated April 18, 1899.

Application filed September 23, 1898. Serial No. 691,674. (No model.)

To all whom it may concern:

Be it known that I, DANIEL VALENTINE, a citizen of Great Britain, residing at Brockton, in the county of Plymouth and State of Massachusetts, have invented new and useful Improvements in Electric Railway Signaling Devices, of which the following is a specification.

This invention relates to improvements in electric signaling devices for railways, and it is applicable to steam or electric railways as well as to cable roads or tramways of any description; and it has for its object to cause electric signals to be operated, preferably, automatically by the passing of trains or cars at proper intervals on the track, so as to indicate to trains going in the same or opposite directions on a single track whether or not the track is clear. For this purpose the invention is carried out as follows, reference being had to the accompanying drawings, wherein—

Figure 1 represents a diagram showing the track, turnouts, and wire connections for operating the signal device. Fig. 2 represents a detail longitudinal section of one of the boxes containing the solenoids by means of which the signals are operated. Fig. 3 represents a cross-section on the line 3 3, shown in Fig. 2; and Fig. 4 represents a cross-section on the line 4 4, also shown in Fig. 2.

Similar letters and figures refer to similar parts wherever they occur on the different parts of the drawings.

The invention is applicable to block-signal systems, as represented in Fig. 1, in which A represents the main track, and B B' the turnouts, located thereon at a proper distance apart, usually a mile or more or less, according to circumstances. At or near the turnout B is located a box C, containing the solenoids for operating an electric signal at such place. Within said box is located a solenoid D, within which is longitudinally movable an oscillating solenoid-bar E, made of soft iron or other magnetic material. To the rear end of such bar E is secured a signal or semaphore F. To the forward end of the solenoid-bar E is secured a spindle G, preferably made of brass or suitable non-magnetic material, and to the outer end of such spindle is secured a metal contact-piece H, which is se-

cured in an insulated manner to said spindle G, as shown in said Fig. 2. On the spindle G is located an expansive coiled spring I, the ends of which press against the forward end of the solenoid-bar E and the forward end of the core of the solenoid D, as shown, and said spring serves to force the solenoid-bar backward to the position shown in Fig. 2 when the locking device on said bar is released. On the rear portion of the solenoid-bar E is a helical or inclined groove *e*, adapted to receive a tooth or projection *d*, preferably attached to the rear end of the spool of the solenoid D, as shown in Fig. 2. It will thus be seen that the solenoid-bar E is caused to move in the direction of the arrow shown in Fig. 2 when the circuit is closed through said solenoid and caused to move in the opposite direction by the influence of the spring I when the locking device on such bar is released, and during such longitudinal movement of the solenoid-bar it is caused to oscillate by the engagement of the tooth *d* with the helical or inclined groove *e*, thus causing a corresponding oscillating motion to be imparted to the signal or semaphore F during the longitudinal movement of the solenoid-bar E. Said tooth *d* serves in conjunction with the helical groove *e* on the semaphore-bar E to prevent the semaphore from turning after being placed in clear or danger position.

For the purpose of holding the solenoid-bar E locked after it has been moved forward by the current through its solenoid I make use of a spring-pressed or gravity lever K, pivoted at *k* and pivotally connected to a solenoid-bar *l*, longitudinally movable within a solenoid L, through which the current is intermittently closed. Within the hollow core of said solenoid L is located an expansive spring M, confined, preferably, between an adjustable screw *m* and the upper end of the solenoid-bar *l*, as shown in Fig. 2.

N is an annular groove on the solenoid-bar E, adapted to receive the lower end of the locking-lever K when the solenoid-bar E is drawn forward by the electrically-actuated solenoid D, so as to hold said solenoid-bar E locked in its forward position, and the lever K is automatically held in such interlocked position by the influence of the spring M.

When the current is closed through the so-

lenoid L, its bar *l* is attracted upward sufficiently to overcome the tension of the spring M, by which the lever K is unlocked from the groove N in the solenoid-bar E, causing the latter to be automatically returned to its normal position (shown in Fig. 2) by the influence of the spring I. When the current is closed through the solenoid D, its insulated contact-piece H is caused to be moved in contact with the circuit-closers O O, which are insulated from each other and preferably secured to the box C, as shown in Fig. 2.

P is a lamp adapted to be lighted when the current is closed through the contact H and circuit-closers O O. Such lamp is preferably arranged in a cluster of a number of bulbs, as represented in Fig. 1. The color of such lamp or cluster of bulbs is preferably red, to indicate "danger."

Q is a movable contact-plate or suitable circuit-closer arranged at or near the turnout B and adapted to establish a ground connection by the passing of the car-wheels of the train or car at such place. Q' is a similar movable contact-plate or circuit-closer arranged for a similar purpose at or near the turnout B', as shown in Fig. 1.

C' represents a box located at or near the turnout B', and it contains parts D' E' F' G' H' L' O' O' P', &c., corresponding to similar parts arranged in the opposite box C and for a similar purpose.

R and R' represent respective ground connections for the lamps P and P', as shown in Fig. 1.

T in Fig. 1 represents the line-feeder or source of a battery—such as a battery, dynamo, &c.—from which leads a wire 5 to the solenoid D, and from the latter leads a wire 6 to the solenoid D' and by means of wire 7 to the movable contact-plate Q', as shown. From the solenoid D' leads a wire 8 to the wire 9, which is connected to one end of the respective solenoids L L' as well as to the lower circuit-closers O O'. From the upper circuit-closer O' leads a wire 10 to and through the lamp or lamps P' and to the ground connection R', as shown. The wire 9 also leads to and through the lamp or lamps P, from which leads a wire 11 to the ground connection R, as shown in Fig. 1. The wire 5, leading from the source T, is also connected to the upper circuit-closer O, and from the lower circuit-closer O leads a wire 12 to the wire 9, as shown. The opposite ends of the solenoids L L' are connected by means of a wire 13, which is connected by means of a wire 14 to the movable contact-plate Q, as shown in Fig. 1.

S and s are switches on the respective wires leading through the lamps P' P for the purpose of cutting such lamps out of the circuit during the daytime, as may be desirable during the operation of the signaling device.

If from any cause the contact-plates Q Q' should become permanently grounded, I place on the respective wires 14 and 7 the switches S'' s'', by means of which the contact-plates

Q Q' may be cut out from the circuit and a ground connection established from the wires 14 and 7, respectively, by means of switches S' s' and wires leading through them from the rails or ground to the respective wires 14 and 7, as shown in Fig. 1, and by means of such switches S' s' the signaling device may be operated non-automatically if for any reason it should be desirable so to do.

The operation is as follows: If a train or car should proceed on the track A in the direction of the arrow shown thereon in Fig. 1 and when passing the contact-plate Q', the circuit from line T will be closed through the solenoid D, causing its solenoid-bar E to be moved forward against the influence of its spring and causing the semaphore F to be set for "danger" and locked in such position. During the forward motion of the solenoid-bar E its contact-piece H is caused to close the circuit through the circuit-closers O O, by which the circuit is closed through the lamp or lamps P as well as through the solenoid D', causing its solenoid-bar E' to be moved forward and causing its semaphore F' to be set accordingly and locked. During the forward motion of the solenoid-bar E' its contact-piece H' is caused to close the circuit through the lamp or lamps P', thus causing the semaphore F, either alone or in connection with the lighted lamp or lamps P, to indicate to a train approaching the turnout B in an opposite direction that the track is not clear. The position of the semaphore or tell-tale F', either alone or in connection with the lighted lamp or lamps P', will indicate to a train following the first train in the same direction that the track between the turnouts B' B is obstructed by a train or car. A train or car as it passes the contact Q' in the direction of arrow shown in Fig. 1 causes the signals F' F to be set and indicates to the man in charge of such train or car that the signal F ahead of him has been set to "danger," thus avoiding the liability to head-on collisions. As the train or car going in the direction of the arrow shown reaches the turnout B it causes the contact-plate Q to close the circuit through the solenoids L L', causing the locking-levers on the solenoid-bars E E' to be released and causing the latter to be automatically returned to their normal positions shown in Figs. 1 and 2, by which the lamps P P' are cut out and the semaphores F F' automatically turned into free or clear track positions.

It will be noticed that in my improved signaling device the solenoid-bars E E' are directly connected to their respective semaphores F F', and consequently a most positive and direct action is imparted from the solenoids to their respective semaphores with a minimum of frictional resistance, thus causing the device to be operated in a very simple, direct, and efficient manner and by as few mechanical and electrical parts as possible.

For the purpose of signaling trains or cars going on the same track in a direction opposite to that shown by arrow in Fig. 1 I use additional yielding contacts like those shown at Q Q' and a duplicate set of solenoids and signals like those hereinbefore described.

Having thus fully described the nature, construction, and operation of my invention, I wish to secure by Letters Patent and claim—

1. In an electric signaling system, movable rail contacts or switches, a source of electrical energy or line feed, solenoids, semaphores or signals, solenoid-bars within said solenoids and operatively connected to said semaphores, springs for actuating said bars in opposition to said solenoids, automatic locking devices for the semaphores, solenoids for releasing said locking devices, and circuit-closers actuated by said bars for automatically conducting the current from one of said solenoids to the other one in the system, substantially as and for the purpose set forth.

2. In an electric signaling system, movable rail contacts or switches, a source of electrical energy or line feed, solenoids, semaphores or signals, solenoid-bars within said solenoids and operatively connected to said semaphores, springs for actuating said bars in opposition to said solenoids, automatic locking devices for the semaphores, solenoids for releasing said locking devices, lamps arranged at or near the rail contacts or switches, and circuit-closers actuated by said bars for automatically conducting the current from one solenoid to the other in the system, and through said lamps, substantially as and for the purpose set forth.

3. In an electric signaling device, a movable rail contact or switch, in combination with a

solenoid, a longitudinally-movable and oscillating semaphore-operating solenoid-bar arranged within it, a spring for operating said bar longitudinally in opposition to the solenoid, a signal or semaphore attached to said bar, and a locking device composed of an auxiliary solenoid, a lever adapted to interlock with the semaphore-operating bar, and an auxiliary solenoid-bar, connected to said lever, and adapted, when acted upon by said auxiliary solenoid, to release said lever from its engagement with said semaphore-operating bar, substantially as and for the purpose set forth.

4. In an electric signaling system, a movable rail contact or switch, a source of electrical energy or line feed, a solenoid, a semaphore or signal, an oscillating solenoid-bar within said solenoid and connected to said semaphore for operating it, a spring for actuating said bar in opposition to said solenoid, a locking device for the semaphore, a secondary solenoid, a circuit-closer for automatically closing the circuit through the secondary solenoid, a secondary solenoid-bar, a secondary semaphore connected thereto and operated thereby, a locking device for the secondary semaphore and a secondary movable rail contact or switch for automatically releasing the locking devices of both of said semaphores, substantially as and for the purpose described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

DANIEL VALENTINE.

Witnesses:

ALBAN ANDRÉN,
WILLIAM W. LOMMUS.