3 Sheets—Sheet 1.

J. P. TIRRELL.

ELECTRIC RAILROAD SIGNAL.

No. 191,732. Patented June 5, 1877.

FIG. 1.

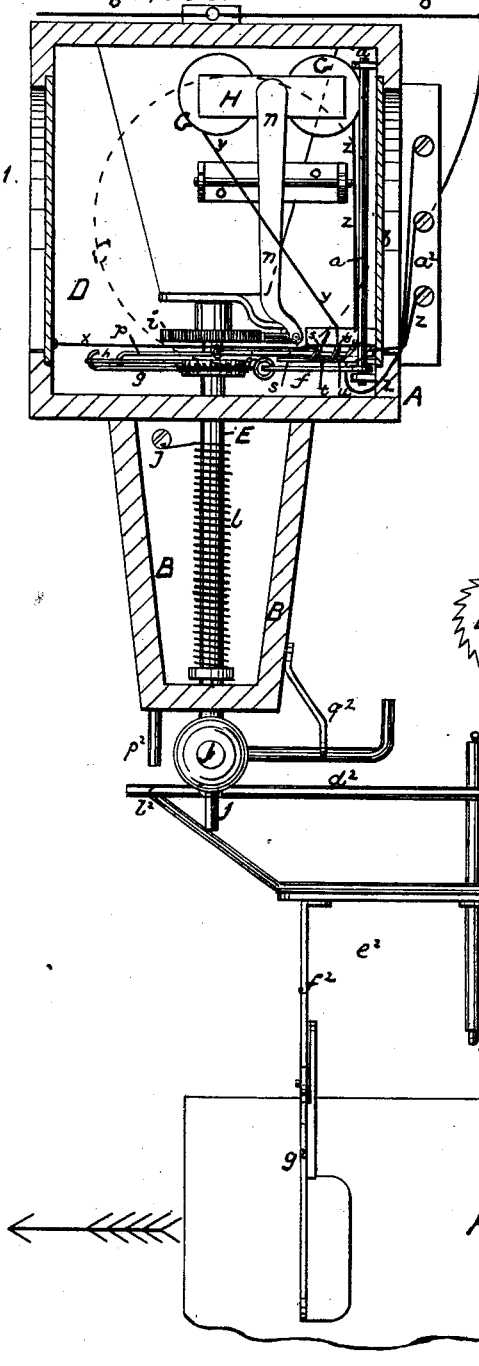


FIG. 5.

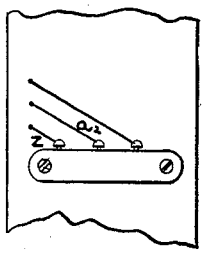


FIG. 4.

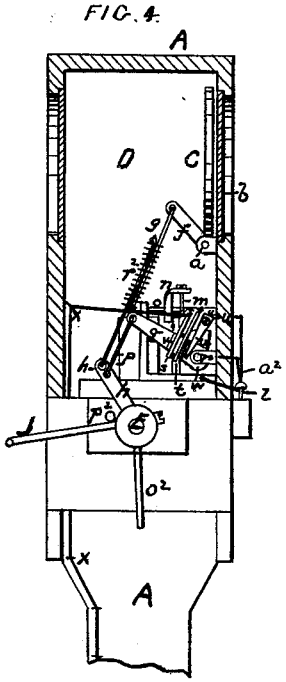
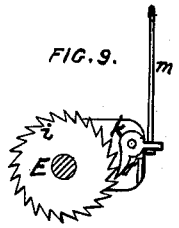


FIG. 9.



WITNESSES.

Edward Kavanagh

Geo. H. Earl.

INVENTOR

J. P. Tirrell

Per Brown Bros

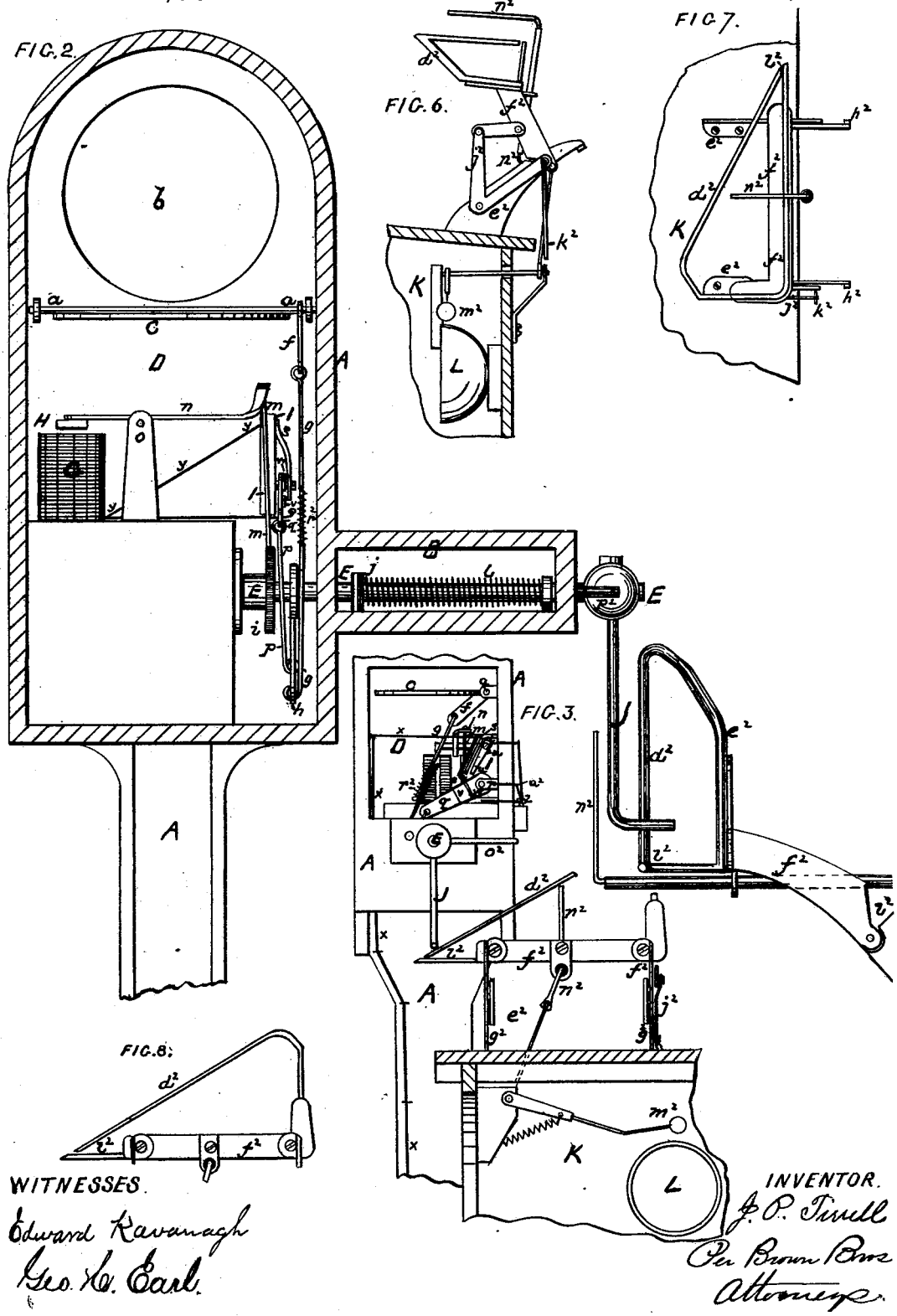
Attorneys

3 Sheets—Sheet 2.

J. P. TIRRELL.

ELECTRIC RAILROAD SIGNAL.

No. 191,732. Patented June 5, 1877.



WITNESSES.

Edward Kavanagh

Geo. H. Earl.

INVENTOR.

J. P. Tirrell

Per Brown Bros

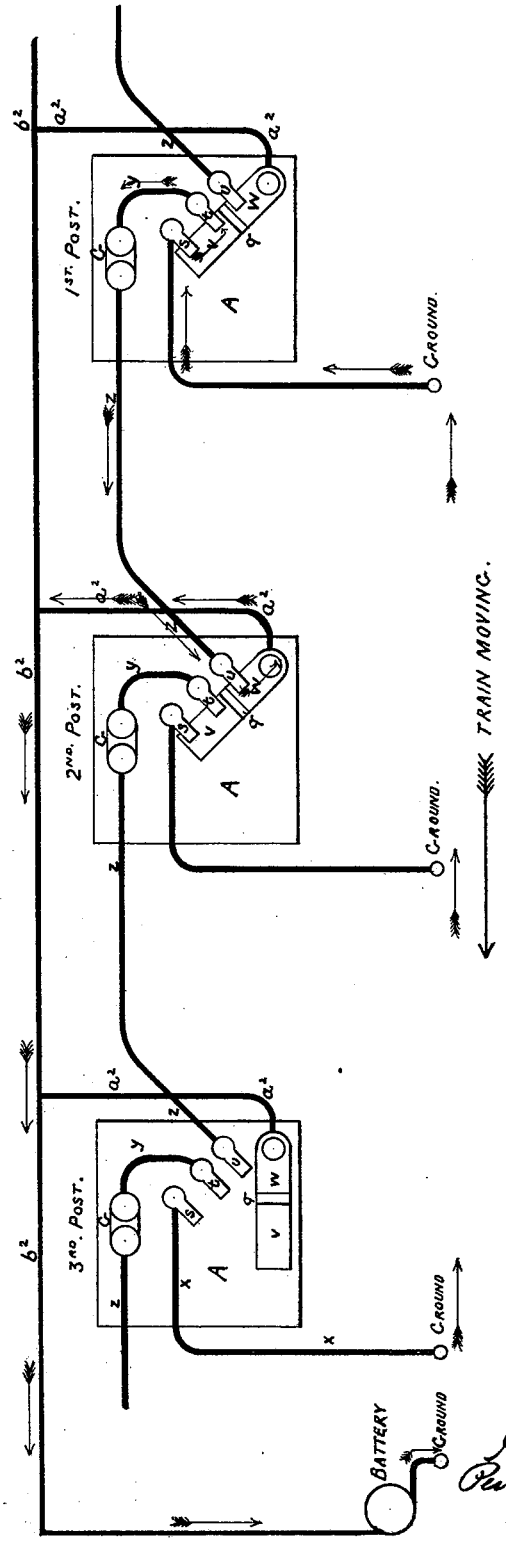
Attorneys.

3 Sheets—Sheet 3.

J. P. TIRRELL.

ELECTRIC RAILROAD SIGNAL.

No. 191,732. Patented June 5, 1877.



WITNESSES.
Geo. H. Bark.
Chas. E. Hibbard

INVENTOR.
J. P. Tirrell.
Per Burton Bro
Attorneys.

UNITED STATES PATENT OFFICE.

JACOB P. TIRRELL, OF SOMERVILLE, MASSACHUSETTS.

IMPROVEMENT IN ELECTRIC RAILROAD-SIGNALS.

Specification forming part of Letters Patent No. **191,732**, dated June 5, 1877; application filed May 18, 1876.

To all whom it may concern:

Be it known that I, JACOB P. TIRRELL, of Somerville, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Electrical Railroad Danger-Signals, of which the following is a specification:

This invention relates to that class of railroad danger-signals which are set and unset by a passing train, or, in other words, to that class of railroad danger-signals which are arranged along the track for a passing train to set, each in succession, and, as it sets each in turn, have the signal just previously set by it unset, and so on through the whole series.

Under this invention posts are located at proper distances apart along the line of track, and each post is provided with a danger-signal, which is adapted to be displayed and covered—that is, set and unset at each post, and, by preference, at a glass window or opening of the post.

The invention consists, principally, in the arrangement of the signals for being set and unset by a passing train, and in such arrangement combines the action of an electric current, all as hereinafter particularly described; and the invention also consists in an arrangement of mechanism upon the cab of locomotive, for setting the signals at each post as it passes the same, and for giving an alarm in the cab of the locomotive next passing a set signal, which mechanism is hereinafter particularly described.

In the accompanying plates of drawings my invention is illustrated.

In Plate 1, Figure 1 is a plan view of the mechanism to the signal of each post, the signal being unset, and also a plan view of the mechanism upon the locomotive-cab for operating the signal of each post as the said cab passes each signal, and also for giving an alarm. Fig. 4 is an elevation of the signal-post with the signal set; Figs. 5 and 9, views in detail. In Plate 2, Figs. 2 and 3 are views in elevation of the mechanism to the signal of each post, and also in elevation of the mechanism on the cab, the signal being unset; Figs. 6, 7, and 8, views in detail.

In the drawings, A represents a danger-signal post, of which there are to be a series arranged alongside of a railroad-track, at suitable distances apart; C, the danger-signal to each post.

The danger-signal C is a circular disk, colored red, and it is hung by a shaft, *a*, within the chamber D of the post A, to be swung up against and down from the glass window *b* in one side of the post, and when the signal C is up it is exposed or set, and when down covered or unset; and with a glass in the side of the post opposite to that having the glass, the signal, when set, can be seen in both directions of the track.

f is a crank-arm on signal-shaft *a*, and *g* a rod connecting said crank *f* with the crank *h* of a horizontal shaft, E. This shaft E projects from the post A toward the railroad-track, and at such projection it is boxed at B, and turns in suitable bearings.

l is a spring coiled about shaft E, and at one end fastened to it, and at the other to a post, *j*, of the boxing B.

i is a toothed wheel on inner end of shaft E, and *k* a spring stop-pawl lever, engaging with the toothed wheel *i* to hold it and its shaft E from turning under the recoil of the spring *l*.

m is a rod connecting stop-lever *k* with a lever, *n*, which turns on a fulcrum at *o*, and carries an armature, H, which is properly disposed above an electro-magnet, G.

p is a rod, which connects crank-arm *h* of horizontal shaft E with an insulated arm, *q*, Fig. 3, hung at *r* on insulated block I, to swing thereon. This insulated arm *q* switches the electric current into and out of the magnet G, as will hereinafter appear, and, for convenience, will be hereinafter designated as the "switch."

s t u are spring-finger pieces, each separately secured to the insulated block I, and each and all in position to have contact with the switch *q* when it is swung in one direction—that is, upwardly — and to be out of contact when it is swung in the opposite direction, or downwardly.

v is a metal plate on switch *q*, for contact

with both of the spring-fingers *s* and *t*, and *w* a metal plate on switch *q*, for contact with the spring-finger *u*. These two metal plates *v* and *w* are independent of each other.

x is an electric wire connecting spring-finger *s* with the ground.

y is an electric wire connecting spring-finger *t* with one pole of the magnet G, and *z* an electric wire connecting the other pole of this magnet G with the spring-finger *u*, which is in the signal-post next beyond along the railroad-track.

a^2 is a wire connecting the contact-plate *w* for spring-finger *u* with an electric wire, b^2, which runs to the several posts, and is connected to one pole of the battery used. This battery has its other pole connected with the ground, as ordinarily.

J is a lever-arm to shaft E, for operating it. With danger-signal C unset, this lever-arm J depends vertically from its shaft E, (see Fig. 3,) and it is then in position to be operated upon by a passing locomotive, provided, of course, with suitable mechanism therefor.

The movement desired to be given to the depending lever-arm J by a passing locomotive is its swing from its vertical position shown in Figs. 2 and 3, upward to the horizontal position shown in Fig. 4, and thus to turn the shaft E a quarter of a turn against its coiled spring *l*, and, through the shaft-connections herein described, thereby bring or set the danger-signal C to the window *b*, and bring the switch *q* into contact with the several spring-fingers *s*, *t*, and *u*, in which positions the said several parts are held by the stop-lever *k* and ratchet-wheel *i* on shaft E until said stop is released, when the reaction of the coiled spring *l* to shaft E turns said shaft back to its first position, which brings down or unsets the signal C, carries the switch *q* out of contact with the spring-fingers *s*, *t*, and *u*, and places the lever-arm J in its original depending vertical position for being again operated upon or swung up, as before.

This described setting of the danger-signal occurs at each signal-post, one after another, as the locomotive continues its travel along the track.

The setting of the signal to each post after the first post completes the electric circuit through the electro-magnet of the post next behind, for both poles of such magnet are then in connection with the ground, as will be presently explained, and thus the armature to such magnet is attracted, which (through lever *n* and rod *m*) connection disengages the stop-pawl *k* from ratchet-wheel *i*, and sets the shaft free to the action of its coiled-spring *l*, whereby the signal connected to said shaft E is unset and the circuit so established broken by the then breaking of contact between the switch *q* and spring-fingers *s*, *t*, and *u*, because of the then downward swing of said switch through its connection herein described with the shaft E.

In Plate 3 is a diagram illustrating three signal-posts, A, and the herein-described wire-connections of their respective magnets G and their respective sets of spring-figures *s*, *t*, and *u* and switch plates *v* and *w* with the main wire b^2, the electric battery, and the ground, and also illustrating, by the posts marked in said diagram "1st post" and "2d post," how the electric current or circuit runs, and is established through the magnet of one post to which the signal has been set by setting the signal to the post next in advance.

In the set of the signal to each post, as before stated, the switch *q*, connected therewith, is brought into contact with the spring-fingers *s*, *t*, and *u* of that post—as, for instance, see first post and second post in diagram, Plate 3, and under this contact of the switch *q* there is then, as to both of said posts, an electric connection between the ground and one pole of the magnet in each of them through the wire *x*, spring-fingers *s*, switch-plate *v*, spring-finger *t*, and wire *y*, which belong thereto, and, as to the first post, an electric connection between the ground and the other pole of its magnet through the battery, the main wire b^2, and its branch wire a^2, which leads to the switch-plate *w* of the second post and its spring-finger *u* and wire *z*, and this, as to the first post, (the electric circuit or current being established through its magnet,) attracts the armature thereof with the results before described.

The small arrows of the diagram illustrate the complete electric circuit through the magnet of first post, above stated, and from the above description and said diagram it is plain to be seen how the set of the signal of each successive post would complete the electric circuit through the magnet and unset the signal of the post next behind.

From the above description it is plain that the signal of each post is unset in turn by the set of the signal in the post next in advance, and that this unset of the signals is secured by operating the stop or holding-pawl for such signal through the attraction of an electro-magnet and the then action of mechanical devices operated by the reaction of a coiled spring.

The lever-arm J at each signal post is operated, as above described, from a passing locomotive by the travel of an incline, d^2, on the cab K under the outer end of each arm, the said incline being of suitable length and rise therefor.

The incline is secured to a frame, e^2, which is fastened to the top of the cab, and this frame is in two parts, f^2 g^2, hinged together, so that the outer part f^2, which is the part that carries the incline d^2, may be swung back to place said incline out of operation on the signals.

Figs. 6 and 7 show the incline d^2 as swung out of action, Fig. 6 being an end elevation, and Fig. 7 a plan view.

h^2 h^2 are rests and supports for the outer part

f^2 of frame e^2 when the incline is in its operating position, and i^2 i^2 abutments, which support the outer part f^2 of frame when swung back over the locomotive-cab.

j^2 is a toggle-lever. (See Fig. 6 more particularly.) This toggle-lever is pivoted to both parts f^2 g^2 of the frame e^2, and it is provided with an operating-handle, k^2 in convenient position to be reached from the cab.

This toggle-lever, if pushed up, swings the incline out of operative position, and if pulled down into operative position, where in straightening, it firmly fixes and holds the incline to its working position.

The incline is constructed to be upwardly sprung open at its lower end l^2.

This allows the incline to pass by a depending signal-arm, J, without effect thereon, if a locomotive be backed on the track.

L is an alarm-bell in locomotive-cab K, and m^2 its striking-hammer, which is connected to a lever, n^2, hung to the frame e^2, which carries the signal-operating incline d^2.

This lever n^2 stands up, and is in position to abut against the arm o^2, with which each signal-shaft E is provided, when such arm depends, as shown in Fig. 4, as it is made to depend in the complete set of the signal to each post.

The abutment of the lever n^2 against the arm o^2 sounds the alarm-bell, and thus warns the engineer that the signal is set, should he fail to have observed it.

The arm o^2 and bell-operating lever n^2 are both of such length, and are both situated relatively to the movement of the incline on a signal-arm, E, for the operating-lever n^2 and arm o^2 to clear each other in the setting of a signal by the incline, and thereby prevent the then sounding of the alarm-bell.

This is important, as the alarm is necessary as a notice of a set signal, so as to warn the engineer of the presence of a train in advance which has not yet passed beyond the next post.

p^2 q^2 are stops at outer end of boxing B, and in position for the abutment of lever-arm J and arm o^2, both of shaft E, as such shaft is swung in the two directions described.

The rod g, connecting signal C with shaft E, is made with an intermediate elastic part, r^2, so as to yield and give, and thus obviate the danger of breaking the glass b by the signal C as the signal is swung up against the glass.

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

1. Mechanism, substantially such as herein described, for setting and unsetting railroad danger-signals, in combination with an electro-magnet G, its armature H, switch q, and spring-fingers s, t, and u, connected with electric wires, substantially as herein described, whereby the setting of one signal secures the unset of a previously-set signal by the then release and action of the setting mechanism to such signal through the then attraction of an electro-magnet, all substantially as herein described.

2. The combination, with the danger-signal C, of the crank-arm f, the rod g, the shaft E, having a crank, h, connected with the rod g, the spring l around said shaft, and the lever-arm J on the outer end of the same, and with an electro-magnet, armature-fingers s, t, and u, and electric wires at each post A, as and for the object set forth.

3. The combination, with the frame e^2, composed of two hinged parts, f^2 g^2, of the incline d^2, as and for the purpose set forth.

JACOB P. TIRRELL.

Witnesses:

EDWIN W. BROWN,

GEO. H. EARL.