No. 832,153. PATENTED OCT. 2, 1906.

C. J. O'NEILL.

ELECTRIC SIGNALING APPARATUS.

APPLICATION FILED FEB. 4, 1905.

2 SHEETS—SHEET 1.

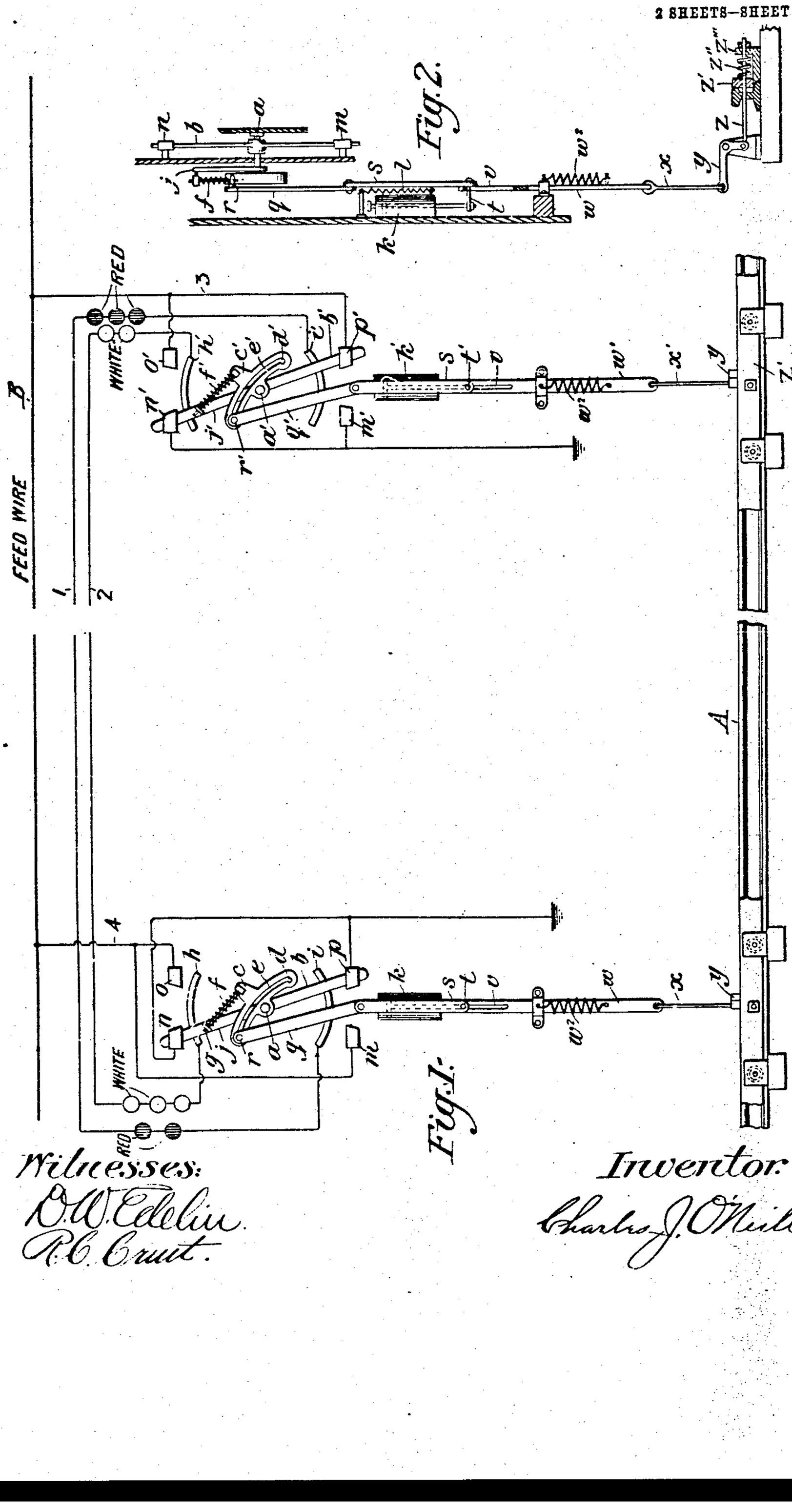

Fig. 1.

Fig. 2.

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Fig. 3.

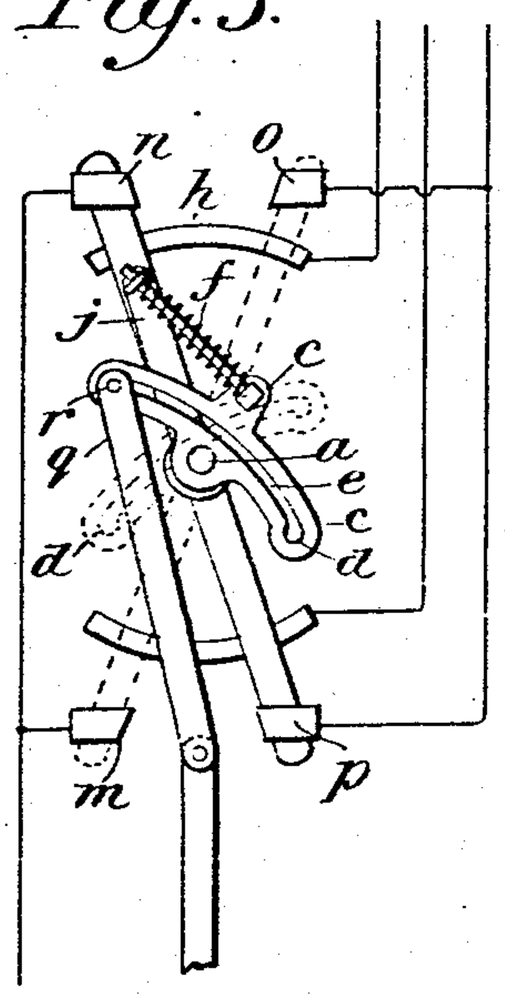
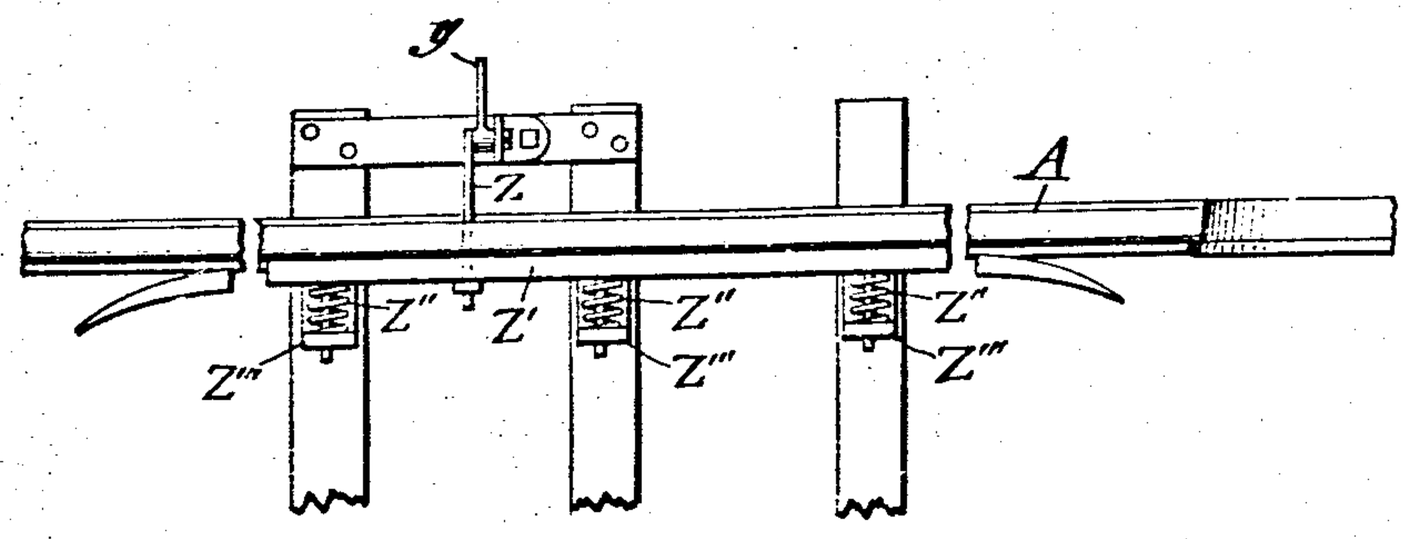


Fig. 4.



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UNITED STATES PATENT OFFICE.

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ELECTRIC SIGNALING APPARATUS.

No. 832,153. Specification of Letters Patent. Patented Oct. 2, 1906.

Application filed February 4, 1905. Serial No. 244,215.

To all whom it may concern:

Be it known that I, CHARLES J. O'NEILL, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Electric Signaling Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to electric signaling apparatus for railways, and has for its object to provide a simple and efficient car or train actuated mechanism for operating the controlling-switches of electric signaling systems, and is more especially intended for use in connection with electrical signaling systems of the class described and claimed in the patent to John L. Wrenn, granted August 11, 1903, No. 756,050.

To this end the invention comprises electrically-operated signals at each end of a track-section to be guarded, a controlling-switch at each station or section end, each of which switches controls the signals at both stations, and mechanism operated by a passing car or train to actuate the controlling-switches, said mechanism including means to prevent the operation of a given switch more than once during the passage of a single car or train.

In the accompanying drawings, Figure 1 is a diagrammatic representation of the invention as applied to one section of track. Fig. 2 is a vertical section of a controlling-switch and the actuating mechanism therefor. Fig. 3 is an enlarged front view of a controlling-switch and its operating mechanism. Fig. 4 is a plan view of a form of track device employed in connection with the switch-operating means.

Referring to the drawings, A indicates one rail of a track-section to be guarded by the signals displayed at each end of said section. It is to be understood, of course, that the section of track may be a portion of the main line of either a single or double tracked road and that each section may constitute a block upon which but one train is allowed at a time. In a single-track road the blocks may be located between sidings or turnouts, or, if the road has double or multiple tracks, each track may be "blocked" by appropriate signal-stations at each section end, as will be understood by persons skilled in the art.

B indicates the main conducting-wire, which runs along the right of way and supplies the necessary current for operating the signals. At each block terminal or signal-station the main line wire B is tapped by a branch wire or lead 3 4, which is connected to the controlling-switch located at the respective stations. Each of said switches is preferably constructed as described in the patent above referred to; but it is to be understood that the invention is not limited to the particular form of switch shown therein, as the said invention is capable of successful application to many other types of controlling-switches which are adapted to be moved to different positions by a car or train to operate the signals. As shown in the drawings and described in the patent aforesaid, each switch comprises an insulating base-piece by which it may be secured upon a suitable support beside the track or right of way, and a switch-blade *b*, pivoted at its middle and having contact pieces or brushes at its ends adapted to coöperate with six fixed contacts which are so disposed with respect to the blade that four of said contacts are engaged by the contact pieces or brushes for each position of the blade. The several fixed contacts are connected to the various circuits as in the Wrenn patent—that is to say, beginning with the left-hand station branch wire 4 is connected to contacts *m* and *o*, respectively, contacts *n* and *p* are connected to a common return, preferably the track-rails or a ground-return, and contacts *h* and *i* are connected to two line-circuits 1 and 2, respectively, which terminate in the corresponding contacts *h'* *i'*, respectively, on the switch at the other end of the block or section. On the latter switch contacts *o'* *p'* are connected by branch wire 3 with feed-wire B, and contacts *m'* *n'* are connected to the common-return circuit. Line-wire 1 serves to operate the danger-signals, and correspondingly line-wire 2 operates the "clear" safety-signals, each of which signals preferably consists of banks of red and white lights, respectively, located at both ends of the block or section, although said signals may comprise any other type of indicating device suitable for railroad-signaling or a combination of any such other device with the lamps aforesaid.

As above described, the signal system operates to display distinctive signals at both stations or block terminals at all times.

When no train or car is on the block, a clear or safety signal is displayed, and if a train enters the block from either end and the corresponding switch is thrown a danger-signal is displayed at both ends of the block or section, and when the opposite switch is operated upon the train leaving the block the clear or safety signals will again be shown at each end. It is to be particularly noted that distinctive signals are always shown at both ends of the block irrespective of which of its alternate positions either of the controlling-switches occupies, and the section will be indicated as clear or blocked at each end under all conditions of operation. Such a system has heretofore been dependent upon manual operation, which fact has rendered it incapable of use on roads having no block attendants or roads operating fast trains or cars, which would not admit of stopping to allow some member of the crew to operate the signals at each block-station. It is the purpose of this invention to provide automatic means for operating the signals, and while the said automatic operating means finds a ready adaptation to this specific system it is found that said operating means is capable of application to other signaling systems. The operating mechanism is the same for all of the switches, and the description of one of said mechanisms will apply to all of the others, considering that at the station at the left-hand end of the block or section, loosely journaled upon the shaft *a* of the switch-blade *b*, is an arc-shaped yoke *c*, having a longitudinal slot *e*, terminating at each end in an enlarged recess *d* below the general level of the lower edge of said slot. Pivotally mounted upon the upper middle edge of said yoke is one end of a rod, which is slidably connected at its other end to a swiveled eye on the end of a lever *j*, fast to the shaft *a* of the switch-blade *b*, said rod serving as a guide for a helical kick-spring *f*, which is confined under compression on said rod between its point of attachment to the yoke and the swiveled eye on lever *j*. A pull-rod *q* for oscillating the yoke is provided for this purpose with a pin *r* in its end, which pin engages the slot *e* in said yoke. Rod *q* is connected by a suitable pin to a link *s*, which in turn is connected by a pin *t* and slot *v* to a link *w*, which is normally held in its upper position by a spring w^2. The link *w* is connected to a suitable track instrument or device in such manner that a downward pull is imparted to said link upon the passage of a car or train over said track device. A simple track device that has been found highly efficient in practical operation consists of a bar *z'*, having outwardly-flaring ends mounted inside one of the track-rails in chairs *z'''* on the cross-ties and held in close engagement with the rail by stout helical springs *z''*, confined between the bar *z'* and the backs of the chairs. A bell-crank lever *y*, mounted on the end of a cross-tie opposite the middle of the bar *z'*, is connected to the latter by a rod *z* and to the link *w* by a link *x*. The wheels of a car or train passing between the rail A and the bar *z'* of the track device will force said bar away from the rail a distance equal to the thickness of the wheel-flanges, and thereby rock the bell-crank and pull the link *w* downward.

Assume that the parts of the apparatus occupy the relative positions shown in full lines in the drawings, with pin *r* occupying the depression *d* in the upper end of slot *e* of yoke *c*, which incidentally establishes a danger-signal. When, however, the bar *z'* is moved outwardly by a wheel-flange, the downward movement of link *w* imparts a corresponding movement to link *s* and pull-rod *q*, thereby causing pin *r* to exert a downward pull on the upper end of yoke *c* and rock the latter on the shaft *a* until the opposite end of said yoke is elevated. As the kick-spring *f* passes the plane of the longitudinal axes of switch-blade *b* and lever *j* said spring, the compression of which has been greatly increased, reacts on the end of lever *j* and kicks the latter quickly into its opposite position, thereby moving the switch-blade into engagement with the opposite set of contacts and closing the opposite circuit to change the signal. This kicking action of spring *f* also serves to break the circuits at the switch-terminals with exceeding rapidity, thereby preventing the formation of arcs when high-tension currents are employed. Springs *l* and w^2, or spring w^2 alone, if links *w* and *s* are made integral, as may be done under certain conditions, serve to lift said links and pull-rod *q* as soon as bar *z'* is released by the wheel-flanges. As rod *q* moves upward pin *r* rides up the slot *e* and drops into the depression *d* at the upper end of said slot, and the switch is ready to be thrown to its opposite position to again change the signals.

It is to be noted that unless especial provision were made to prevent such an occurrence the switch would be operated by each wheel passing over bar *z'*, as the latter would spring back after it was freed by each wheel, thereby permitting the pin to be raised in the slot *e*, and the succeeding wheels would each move said bar outward and the pin *r* downward to operate the switch and change the signal for each wheel engaging the track device. It is evident that by making the length of the bar *z'* greater than the distance between any successive pair of wheels on a car or train the said bar would be operated by the leading wheel only, as the next succeeding wheel-flange would pass between said bar and the rail before the preceding flange had cleared the bar, the latter would be held in its outer position until the car or train had passed over it, and the signal-controlling switch would be operated but once,

however long the train might be. Such a length of bar might prove too heavy for safe operation, and, generally considered, a shorter bar is found to be preferable. A short bar, however, will be operated by each wheel engaging the same, and in order to prevent the switch being operated by any other than the leading wheel of a car or train the timing mechanism illust ated in the drawing is employed. Said timing mechanism consists of a dash-pot *k*, fastened to the base of the switch and having its piston-rod connected to link *s*, so that as the latter is drawn downward to throw the switch the piston of the dash-pot is moved outward, permitting the cylinder behind it to fill with air. The upward pull of spring *l* to return link *s* is resisted by the air-cushion in the dash-pot, and as the air can only escape by way of a small leak-valve in the top of the cylinder the return of the link *s* and pull-rod *q* may be rendered as slow as desired. By making the leak-valve adjustable the actual time required for spring *l* to return the link *s* and rod *q* may be varied at will. As pin *r* has to engage the recess *d* in the upper end of the slot *e* in yoke *c* before the latter can be moved, it will be seen that the rod *q* and its connection may move freely up and down in the slot *e* below the depression *d* without throwing the yoke. The pin-and-slot connection between the links *s* and *w*, however, permits the lower link *w* and the track instrument to vibrate between their extreme positions in response to the passage of the several wheels without affecting the link *s* and pull-rod *q*, which have been pulled down by the passage of the first wheel over bar *z'* and are held in such position by the dash-pot *k*. After the car or train has passed spring *l* gradually overcomes the retarding action of the dash-pot, and the mechanism is returned to normal position to actuate the switch when a succeeding train or car passes.

What I claim is—

1. In an electric signaling apparatus for railways, a circuit-controlling switch movable to different positions to operate distinctive signals, and mechanism operable by separate cars or trains to move said switch to successive positions, said mechanism comprising means to prevent said switch being actuated by successive cars of a single train.

2. In an electric signaling apparatus for railways, a circuit-controlling switch movable to different positions to operate distinctive signals, and mechanism operable by separate cars or trains to move said switch to successive positions, said mechanism comprising a timing device to prevent said switch being actuated by successive cars of a single train.

3. In an electric signaling apparatus for railways, a circuit-controlling switch movable to different positions to operate distinctive signals, and mechanism operable by the first wheels of separate cars or trains to move said switch to successive positions, said mechanism comprising means to prevent said switch being actuated by successive wheels of a single car or train.

4. In an electric signaling apparatus for railways, a circuit-controlling switch movable to different positions to operate distinctive signals, and mechanism operable by the first wheels of separate cars or trains to move said switch to successive positions, said mechanism comprising a timing device to prevent said switch being actuated by successive wheels of a single car or train.

5. In an electric signaling apparatus for railways, an oscillating circuit-controlling switch operating distinctive signals in its respective positions, a track device actuated by successive separate cars or trains to move said switch to its alternate positions, and means in the connection between said switch and said track device to prevent the operation of said switch more than once by a single car or train.

6. In an electric signaling apparatus for railways, an oscillating circuit-controlling switch operating distinctive signals in its respective positions, a pivoted yoke, a kick-spring connecting said yoke and the oscillating switch, a pull-rod having a sliding connection with said yoke, whereby the switch is moved to alternate positions by successive actuations of said pull-rod, and a track device connected to said pull-rod, the parts being so correlated that the switch is operated once only by the passage of a car or train over the track device.

7. In an electric signaling apparatus for railways, an oscillating circuit-controlling switch operating distinctive signals in its respective positions, a pivoted yoke, a kick-spring connecting said yoke and the oscillating switch, a pull-rod having a sliding connection with said yoke, whereby the switch is moved to alternate positions by successive actuations of said pull-rod, a timing device connected to said pull-rod to retard the return of the latter to position to operate said yoke, and a track device having a sliding connection with said pull-rod so that the latter may be operated but once within the limit of the timing device to move the switch.

8. In an electric signaling apparatus for railways, an oscillating circuit-controlling switch operating distinctive signals in its respective positions, a pivoted yoke, a kick-spring connecting said yoke and the oscillating switch, a pull-rod having a sliding connection with said yoke, whereby the switch is moved to alternate positions by successive actuations of said pull-rod, a spring to return the pull-rod to position to operate said yoke, a dash-pot connected to said rod to retard the action of said spring, and a track device

having a sliding connection with said pull-rod so that the latter may be operated but once within the limit of the timing device to move the switch.

9. In an electric signaling system for railways, a line-wire connecting the stations, signals at each station controlled from the line-wire, a switch at each station, a return connection for each switch, connections between each switch, the feed-wire, and the line-wire to establish a signal at each station, and car-actuated mechanism for operating each of said switches, said mechanism comprising a timing device to prevent the corresponding switch being operated more than once by the passage of a single car or train, whereby a car or train entering at either end of the section between the stations will establish a signal at both stations and upon leaving said section at either end will discontinue said signal.

10. In an electric signaling system for railways, a feed-wire, two line-wires connecting the stations, distinctive signals at each station controlled from the respective line-wires, a switch at each station, a return connection for each switch, connections between each switch, the feed-wire and the respective line-wires, whereby a signal is always maintained at each station and upon the operation of either of said switches the signal is changed at each station, and car-actuated mechanism at each station for operating the corresponding switch, said mechanism comprising a timing device to prevent the corresponding switch being operated more than once by the passage of a single car or train, whereby a car or train entering at either end of the section between the stations will establish a signal at both stations and upon leaving said section at either end will discontinue said signal.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES J. O'NEILL.

Witnesses:

J. E. HUTCHINSON, Jr.,

R. C. CRUIT.