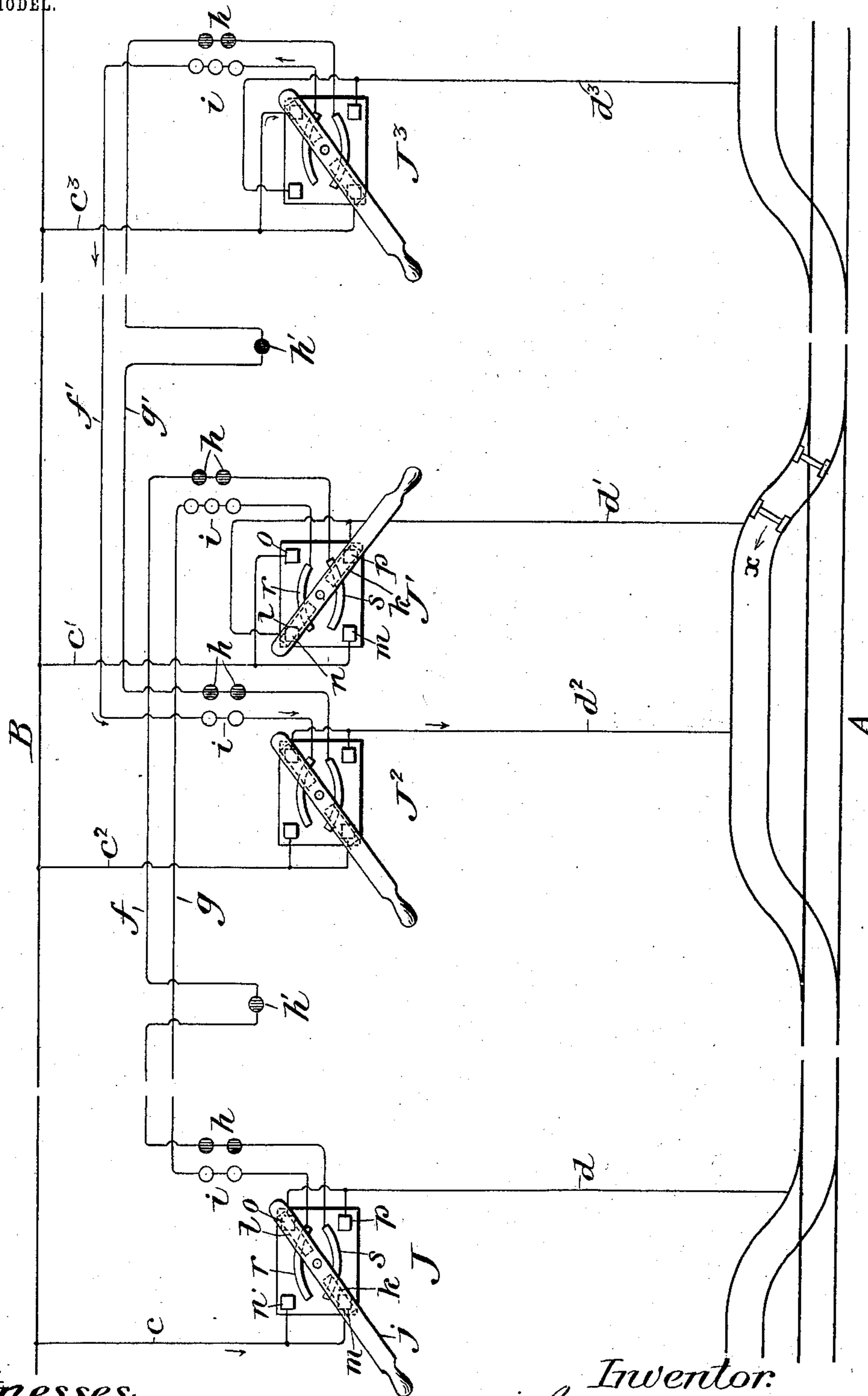


J. L. WRENN.
ELECTRICAL SIGNALING SYSTEM.

APPLICATION FILED MAY 11 1903.

NO MODEL.



Witnesses:

Chas. J. O'Neill
J. E. Hutchinson Jr.

Inventor:

John L. Wrenn,
by Anne Goldsborough,
Attorney

UNITED STATES PATENT OFFICE.

JOHN L. WRENN, OF WASHINGTON, DISTRICT OF COLUMBIA.

ELECTRICAL SIGNALING SYSTEM.

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To all whom it may concern:

Be it known that I, JOHN L. WRENN, a citizen of the United States, residing at Washington, District of Columbia, have invented certain
5 new and useful Improvements in Electrical Signaling Systems; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable
10 others skilled in the art to which it appertains to make and use the same.

The exigencies of railway signaling require that signals be set at both ends of a section or block to indicate at all times the condition of said section, whether clear or occupied,
15 that the signals be simple and unmistakable in character under any circumstances, and that the operation of the signal-actuating mechanism be certain and positive, leaving nothing to the discretion or judgment of the operator and avoiding the necessity of interpreting complex rules or orders. Many forms
20 of automatic signaling systems have been heretofore devised to meet these requirements; but experience has demonstrated that such systems are so uncertain of operation and unsatisfactory in results as to constitute a source of positive danger rather than a factor of safety, in that the apparatus is seriously affected by abnormal conditions of the
30 weather and excessive charges on the line. This is especially true in respect of signaling systems for electric railways operated by the line-current, and so great has the prejudice against automatic signals become that electric railway engineers generally refuse to consider any other than a manually-operated signal.
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My invention has to do especially with signaling systems for electric railways, and comprises distinctive signals—*e. g.*, red and white lights—at each station or block-terminal, which signals are preferably operated by current from the trolley-wire or feed-wires, and a terminal-switch, preferably to be operated
45 by hand, at the respective stations or block-terminals, the said switches of a given block coöperating to display appropriate signals at all times and depending for their coöperative effect upon the shifting of either one of said
50 switches. For instance, if the signals show a clear block the movement of the switch at either end will cut out the clear-signal and

display the danger-signal at each station, and vice versa, so that under all circumstances the signal indication is changed when one
55 only of the switches is operated.

In addition to the above-mentioned features it is the purpose of the invention to provide auxiliary signals located between the stations or in advance of the main signals to
60 indicate the condition of the latter to constitute a check or guide for the man operating the switch.

The accompanying drawing illustrates in diagram a simple form of my invention applied to a single-track electric railway.
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Referring to the drawing, A indicates the main line of a single-track electric railway provided at appropriate intervals with turnouts or sidings, the sections between the
70 respective turnouts constituting blocks upon which but one car or train is allowed at a time. In order to indicate the condition of the blocks by a positive signal at all times, I establish at each end of the respective blocks
75 a controlling-switch and distinctive signals, which signals are set by one of the crew of a passing car or train as the latter enters or leaves the block.

B indicates the trolley-wire or one of the
80 feed-wires therefor, and to said wire B at each station or block-terminal there is connected a branch wire or lead, as $c\ c'\ c^2\ c^3$, which is connected to a controlling-switch, as $J\ J'\ J^2\ J^3$. Each of said switches comprises
85 an insulating base-piece, by which it may be secured to a trolley-pole or other suitable support, upon which is pivoted a handle j , provided with contact pieces or brushes $k\ l$, which consist of metallic plates or springs insulated
90 from the handle and from each other and six contact-pieces on the base, which are so disposed with respect to the brushes on the handle that four of said contacts are engaged by said brushes for each position of the handle.
95 The contacts on the base consist of four metallic studs or plates $m\ n\ o\ p$, disposed about the center of said block, and preferably at the corners thereof, and two elongated contacts $r\ s$, which are so disposed about the center of
100 the switch as to be always in engagement with the respective brushes l and k . Beginning with the left-hand switch of the left-hand block shown in the drawing, branch

wire *c* is connected to contacts *m* and *n*, respectively, while contacts *o* and *p* are connected to a common return-circuit, preferably the track-rails, or other ground-return, by wire *d*, and contacts *r* and *s* are connected with two line-circuits *g* and *f*, which terminate in the corresponding contacts *r* and *s* on the switch at the right-hand end of the block. Circuit *g* is adapted to operate the clear or safety signals, which in the form of my invention illustrated comprise incandescent lamps *i* in series on said line *g*, part of said lamps being located at each station. Line *f* serves to operate the danger-signals, which preferably comprise red lights *h*, likewise divided between the stations or block-terminals. It is to be noted, of course, that the form and character of the signal is to be determined by the circumstances in each case and may consist of lights or semaphores or a combination of both or, in fact, of any of the well-known forms of electrically-operated signals. The switch *J'* at the opposite end of the block is structurally the same as switch *J* and differs only in the particular mode of wiring, the branch wire *c'* being connected to the diagonally opposite terminals *m* and *o*, while the wire *d'*, connecting the switch with the return-circuit, is connected with the diagonally opposite contacts *n* and *p*.

In order to indicate to the conductor or other person setting the signals that the signals are operating properly, I preferably interpose in the line-circuits a pilot-signal, as *h'*, which is operated simultaneously with the main signals and is located at some point between the stations or at suitable points in advance of either switch. I have shown such pilot-signals in connection with the danger-signals only; but it is to be noted that they may be used with both the danger and safety circuits, if desired.

In order to completely protect the road, the block-signals of successive sections are overlapped, as shown at *J' J''*, so that a car on one block will be apprised of the condition of the block next ahead before reaching the end of its own block.

The operation of my signal system is as follows: Assuming a car to be proceeding in the direction indicated at *x*, the block on the left being clear, the conductor or motorman throws switch *J'* to the position shown in the drawing. This will immediately set the danger-signals *h h* at both ends of the block and also set the pilot-signals *h'*. Current enters by way of branch *c*, contact *m*, brush *k*, contact *s*, line-wire *f*, to contact *s* on switch *J'*, brush *k* on said contact, lead *d'*, to the return, and lights the various signal-lamps, which effectively close the block against the entry of cars in either direction. On arriving at the end of the block the motorman operates switch *J*, throwing it into a position opposite that shown in the drawing, breaking the circuit *f* of the danger-signal and establishing the safety-circuit *g* as follows: from trolley-wire

B to branch *c*, contact *n*, brush *l*, contact *r* of switch *J*, circuit *g*, contact *r* of switch *J'*, brush *l*, contact *n*, and lead *d'* to the return. It is to be noted that in any event signals are displayed at each end of the block, indicating at once whether the car may proceed or must wait until the block is clear, and this irrespective of the direction in which the car blocking the line has proceeded. For instance, if the section were blocked by a car proceeding ahead of the first-mentioned car in the same direction the danger-signal would be cut out and the safety-signals operated when the blocking car reached the end of its section, indicating that the following car might proceed. Should the car be proceeding in the opposite direction, substantially the same operation would take place, except of course that the switch at the head of the section, where the waiting car was blocked, would be operated by the first-mentioned car on passing the turnout.

It is to be particularly observed that the system is exceedingly simple in construction and operation and may be installed at a comparatively low cost, that it is not dependent for its successful working upon any conditions of the weather, and that, above all, it requires no particular skill and permits no exercise of discretion on the part of the operator. The only necessary rule to be followed is that a clear block being shown by the white lights or other safety-signal before entering the block the conductor or motorman must throw the switch at the entrance of the block to set the danger-signal, and upon leaving the block the switch at the exit end thereof must be thrown, thereby clearing the block. It is absolutely immaterial what the relative positions of the switches be to show one of the alternative signals, as the operation of either switch will display the opposite signal. Consequently on entering or leaving a block or on backing out of a block it is only necessary to operate the switches at the block ends successively or the switch at one end of the block alternately to properly block and clear the section, respectively. Furthermore, as the line-wires by which the signals are operated are entirely separate from each other and are therefore never connected together under any conditions of operation it is impossible that current from one line-wire could ever operate the signals in the other line-wire, and thereby give a false signal.

Having thus described my invention, what I claim is—

1. In a signal system for railways, a trolley or feed wire having a branch at each station, two disconnected line-wires connecting the stations, distinctive signals at each station operated by the respective line-wires, a terminal switch at each station, and a return connection for each switch, the switches at the respective stations cooperating to connect the trolley or feed wire with one or the other of said lines through one or the other of said

branches and the return connection of the opposite switch, and thereby display signals of the same character at each station.

2. In a signal system for railways, a trolley or feed wire, having a branch at each station, two line-wires connecting the stations, one of said wires operating safety-signals and the other operating danger-signals at each station, a terminal switch at the respective stations, and a return connection for each switch, each of said switches comprising an operating-lever having bridging contact-pieces, two stationary contacts connected to the respective line-wires, two contacts connected to the branch wire and two contacts connected to the return, so arranged that the operation of one switch will change the character of the signal at each station.

3. In a signal system for railways, a trolley or feed wire, two disconnected line-wires connecting the stations, distinctive signals at each station, controlled by the respective line-wires, a switch at each station, a return connection for each switch, and connections between each switch, the feed-wire and the respective line-wires, whereby a signal is always maintained at both stations and upon the operation of either of said switches, the signal is changed at each station.

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

JOHN L. WRENN.

Witnesses:

CHAS. J. O'NEILL,

EDWIN S. CLARKSON.