

907,668.

S. A. WOOD.
BLOCK SIGNALING APPARATUS.
APPLICATION FILED JUNE 27, 1907.

Patented Dec. 22, 1908.
3 SHEETS—SHEET 1.

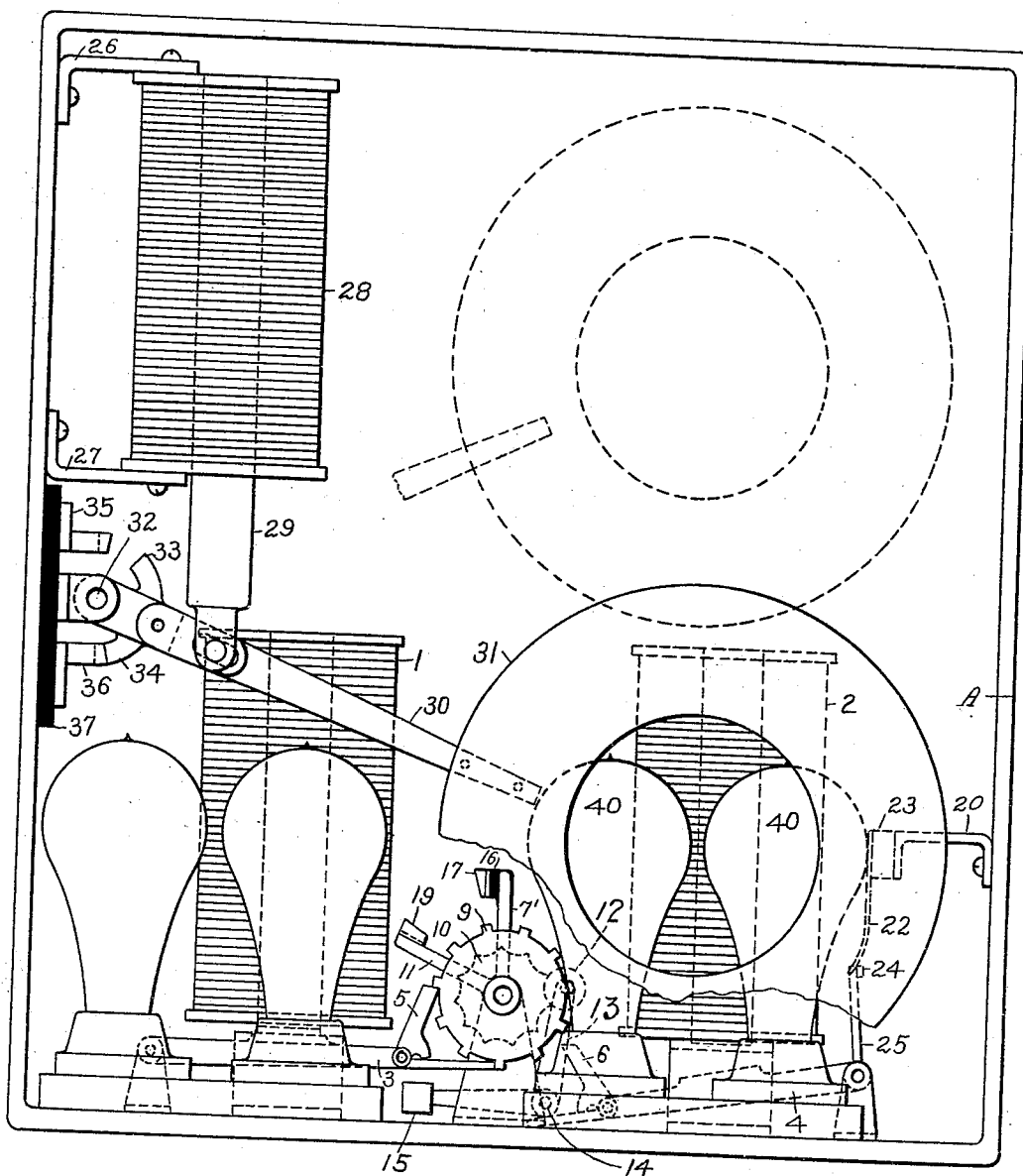


Fig. 1

Witnesses.

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Fig. 3

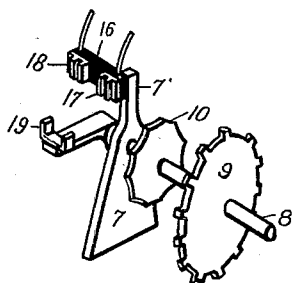


Fig. 4

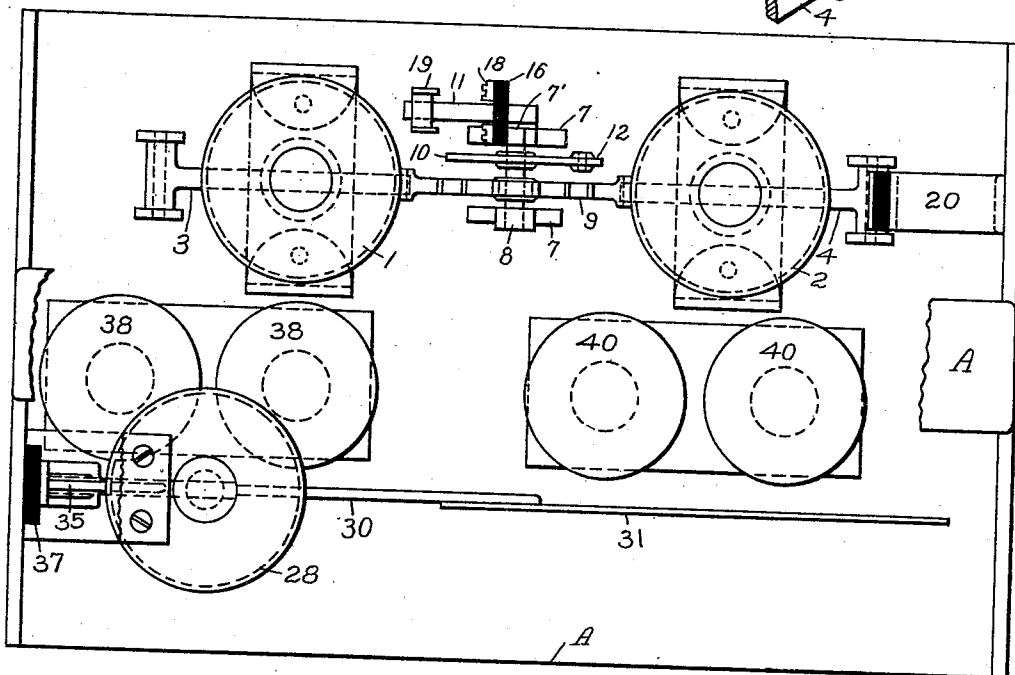
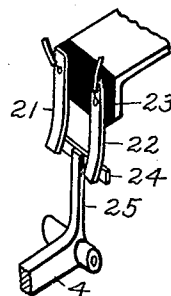


Fig. 2

Fig. 5

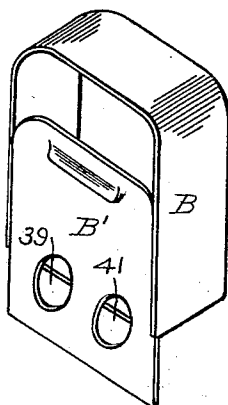
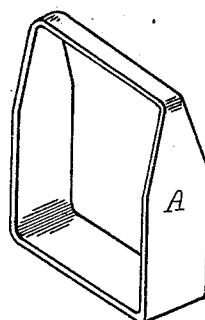


Fig. 6



Witnesses.

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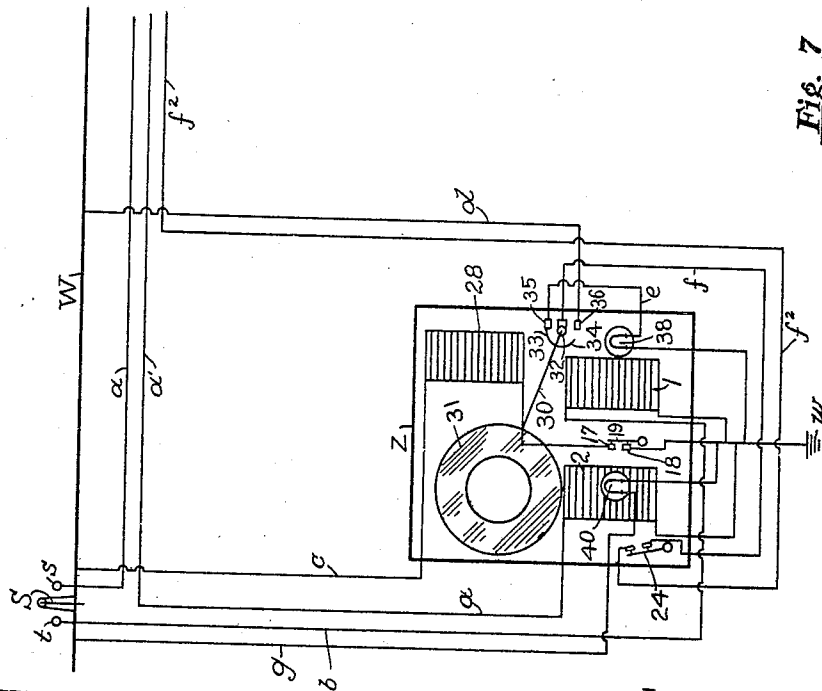
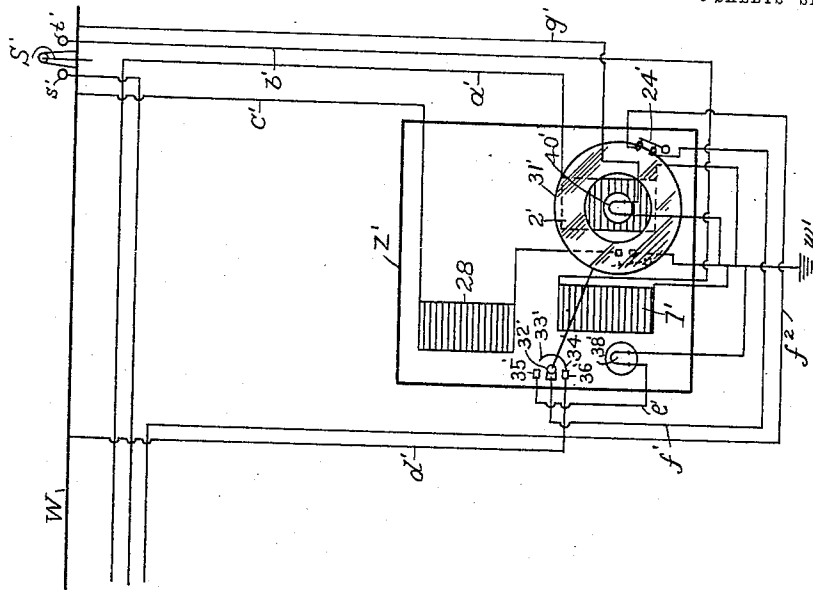


Fig. 7

Witnesses.

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UNITED STATES PATENT OFFICE.

STEPHEN A. WOOD, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR OF ONE-HALF TO RECORD ELECTRIC RAILWAY SIGNAL COMPANY, OF PROVIDENCE, RHODE ISLAND, A CORPORATION OF RHODE ISLAND, AND ONE-HALF TO UNITED ELECTRIC SIGNAL COMPANY, OF PROVIDENCE, RHODE ISLAND, A CORPORATION OF RHODE ISLAND.

BLOCK-SIGNALING APPARATUS.

No. 907,668.

Specification of Letters Patent.

Patented Dec. 22, 1908.

Original application filed February 14, 1906, Serial No. 300,960. Divided and this application filed June 27, 1907.

Serial No. 381,004.

To all whom it may concern:

Be it known that I, STEPHEN A. WOOD, of the city and county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Block-Signaling Apparatus, of which the following is the specification, the same being a division of my pending application, Serial No. 300,960, filed February 14, 1906.

The invention relates to block-signaling apparatus for railways in which an indicator is operated by a moving car to show that the block is occupied or is clear, and has for its object to provide means for indicating to every car entering a block that it has operated the signal at the opposite end of the block.

To this end the invention consists of the novel construction and combinations herein- after described and claimed.

In describing my invention in detail reference will be made to the accompanying drawings in which—

Figure 1 is a side elevation of my improved signaling apparatus. Fig. 2 is a plan view of the same with the top of the strap or casing, in which the mechanism is mounted, removed. Figs. 3, 4, 5 and 6 are details. Fig. 7 is a diagrammatic view illustrating my system of wiring between the signals at each end of the block.

Referring to the drawings, A is a suitable strap or casing in which the signal-operating mechanism is secured. This strap or casing is constructed and adapted to be inserted within a casing B provided with a suitable cover B' and which may be secured in place upon a pole or other convenient place to display the signals. With this construction, if the device at any time becomes inoperative, the mechanism may be quickly removed by removing the casing A and inserting a new mechanism.

Mounted upon the bottom of the casing A are two electro magnets 1 and 2 and two pivoted armatures 3 and 4 adapted to be operated by said magnets. Pivottally mounted adjacent to the ends of each of said armatures 3 and 4 are the actuating pawls 5 and 6. Mounted in suitable standards 7 secured to the bottom of the casing A is a horizontal

shaft 8, upon which are mounted the ratchet-wheel 9, detent-wheel 10, and arm 11. The ratchet-wheel 9 is mounted directly over the pawls 5 and 6 and in operative relation thereto. The detent wheel 10 is engaged by a roller 12 loosely mounted upon the end of a bell-crank lever 13 pivoted at 14 and provided with a weight 15 upon the other end thereof, adapted to hold the roller 12 against said detent-wheel to prevent the same from turning when the ratchet-wheel 9 is not being acted upon by either of the pawls 5 or 6. One of the standards or supports 7 is provided with an upright extension 7' to which is secured an insulating block 16 provided with wire terminals 17 and 18, which are adapted to be engaged by the switch-blade 19 mounted upon the arm 11.

Secured to the side of the casing A is a bracket 20, mounted upon the end of which are two spring wire terminals 21 and 22, insulated from said bracket by the insulating block 23 and adapted to be engaged by a switch 24 secured to an arm 25 on the armature 4.

Supported by the brackets 26 and 27 is a solenoid 28, the armature 29 of which is pivottally connected to an arm 30 which carries a target 31 upon its free end, in the center of which is a transparent red glass or other suitable transparent material. The arm 30 is pivoted at its other end to the wire terminals 32 and is provided with switch-blades 33 and 34 adapted to alternately engage the wire terminals 35 and 36. The wire terminals 32, 35 and 36 are mounted on the insulating block 37, which is secured to the side of the casing A. Mounted upon the bottom of the casing A are two electric incandescent lamps 38 located so as to shine through the opening 39 in the cover B', which said opening is provided with a green glass or other suitable green transparent material. Mounted upon the other side of the base of the casing A are the two other electric incandescent lamps 40 arranged to shine through the opening 41 in the cover B', which opening is provided with a white glass, or if desired may be left open without any glass in the same. While there are shown two lights 38 and two lights 40, it will be understood that only one light at each

opening is necessary. When two lights are used, one is a spare or reserve light which is arranged to be automatically switched in when the other burns out. Such an arrangement is old and well-known, and requires no description, as I make no claim thereto. The current by which the signaling mechanism in the casing A is operated is taken from the trolley wire W, and after the current has passed through its circuit and performed its work, it is conducted through the wire *w* to the ground.

Referring to Fig. 7, the wiring for my electric signaling apparatus is as follows: Each end of the block section is provided with a signaling apparatus Z Z', both of which apparatus are identical in construction and are actuated at the same time to set the necessary signals when a car enters an empty block and to restore said signals to normal conditions when the last car leaves the block. Mounted above or adjacent to the trolley-wire W at each end of the block are the gravity return switch-levers S S' adapted to be operated by the passing of the trolley-wheel or by any other convenient method. Located upon either side of the switch-levers S S' and adapted to be engaged thereby are the switch-points *s*, *t* and *s'*, *t'*. Extending from the switch-point *s* is the signal circuit *a* which passes through the electro magnet 2' in the signaling apparatus Z' to the ground wire *w'*. Extending from the switch-point *s'* is a similar electric circuit *a'* which includes the electro magnet 2 in the signaling apparatus Z. Extending from the switch-points *t* *t'* are the electric circuits *b* *b'* which include the electro magnets 1 and 1' and are connected to the ground wires *w* *w'* respectively. Extending from the trolley-wire W are the circuits *c* *c'* which include the solenoids 28 and 28' and the jack-knife switch 19. The electric circuit for operating the green signal lights 38 and 38' are the circuits *d* *d'* extending from the trolley-wire W to the terminals 36, 36'. Extending from the terminals 35, 35' are the circuits *e* *e'* which include the green lights 38, 38' respectively, and extending from the terminals 32, 32' are the circuits *f* *f'* which include the double pole switches 24, 24' and the wire *f*² connecting said switches. Extending from the trolley wire W are the electric circuits *g* *g'* which connect with the grounded wires *w* *w'* and include the lights 40 and 40', which it will be seen are always lighted.

The operation of the device is as follows: When the block is clear and the signaling mechanism at Z Z' is in its normal position the jack-knife switch 19 is in the position to close the circuit *c*, as shown in the signaling apparatus Z at the left in Fig. 7, thereby energizing the solenoid 28, and the target 31 is held in its raised position and the lights 40 and 40' at each end of the block show a white

light through the opening 39 in the cover B', thereby indicating that the block is clear. When a car enters from the left of Fig. 7 the switch-lever S is thrown in contact with the switch-point *s* and sends a current over the circuit *a* which energizes the magnet 2' and causes the armature 4 to rise. As the armature 4 rises its detent pawl 6 engages the ratchet-wheel 9 and revolves said ratchet-wheel a partial revolution to the left, thereby moving the switch-blade 19 out of contact with the terminals 17 and 18, deenergizing the solenoid 28 and allowing the target 31' to fall between the lamps 40' and the opening 41, as shown at the right in Fig. 7, thereby showing a red or danger signal in said opening 41. The distance the ratchet-wheel moves is limited by the end of the armature 4 which engages the ratchet-wheel and locks it against further rotation. As the target 31' falls it brings the switch-blade 34' in contact with the terminal 36' and causes the current to pass from the circuit *d'* through the circuits *f'* *f*² and *f* to light the green light 38 in the apparatus Z. As will be seen, this cautionary green signal can only be set when the target 31' has dropped to give the danger signal at the opposite end of the block and thus notifies the entering car that the danger signal at the opposite end of the block has been set. The engagement of the switch-lever S with the switch-point *s* continuing but a moment, the armature 4 immediately drops by gravity upon completing its stroke, and the pawl 6 drops down past the next tooth on the ratchet-wheel 9 into position to engage said next tooth and revolve said ratchet-wheel another partial revolution, when a second car shall enter the block and move the switch-lever S again into contact with the switch-point *s* to energize the magnet 2'. When another car enters the block before the first car has left said block the magnet 2' will again be energized and through the mechanism above described turn the switch-blade 19 another partial revolution to the left and still further away from the terminals 17 and 18, and so on with every car that enters the block before the first car has left it. As will be seen, the green light 38 remains lighted as long as the block is occupied, and while the first car is notified that the danger signal is set at the opposite end of the block by the lighting of said green light, all subsequent cars entering said block will be notified that the mechanism for operating said danger signal has been further operated by a flash from the green light 38 caused by the switch 24 breaking the green light circuit *f'* and *f*² as the armature 4 is raised to rotate the ratchet-wheel 9, thereby extinguishing the green light 38. As soon as the armature 4 has operated to revolve the ratchet-wheel 9, it will drop back to normal position by gravity and

bring the switch 24 again in contact with the terminals 21 and 22 and complete the green light circuit, thereby relighting the green light 38. As this operation takes but a moment, it produces a flash of said green light 38. Thus it will be seen that every car entering a block is notified that it has operated the signal at the opposite end of said block. As the cars pass out of the block to the right they in turn operate the switch-lever S' and close the circuit b' which energizes the magnet 1' and operates the armature 3 and operating pawl 5 to revolve the ratchet-wheel 9 and switch-blade 19 to the right. When the last car passes out of the block the switch-blade 19 is again brought into contact with the terminals 17 and 18, thereby completing the circuit c' which energizes the solenoid 28', thereby raising the target out of the danger position into the position shown at the left in Fig. 7 and clearing the signals. At the same time the switch-blade 33' engages the terminal 35', thereby breaking the green light circuit and extinguishing the cautionary signal.

What I claim as my invention and desire to secure by Letters Patent is:

1. In a signaling apparatus, a lamp-circuit normally open, means for automatically closing said lamp-circuit when the first car enters a block, and means for automatically opening and closing said lamp-circuit when a subsequent car enters the block.

2. In a signaling apparatus, a target-circuit normally closed, a lamp-circuit normally open, means operated by a car for opening said target-circuit, means for closing the lamp-circuit when the target-circuit is opened, and means for opening and closing said lamp-circuit while said target-circuit is opened.

3. In a signaling system, a target-circuit normally closed, a lamp-circuit normally open, a circuit breaker operated by an electromagnet and ratchet-wheel for opening said target-circuit, means for closing said lamp-circuit when the target-circuit is broken, and

means for opening and closing said lamp-circuit whenever said ratchet-wheel is operated in one direction.

4. In a block-signaling system, a target-circuit normally closed, a lamp-circuit normally open, a circuit breaker operated by an electromagnet to open said target-circuit when a car enters a block, means for closing said lamp-circuit when the target-circuit is broken, and means for opening and closing said lamp-circuit when a subsequent car enters said block.

5. In a signaling system, a target-circuit normally closed, a lamp-circuit normally open, an electromagnet and an armature therefor adapted to operate a circuit breaker to open said target-circuit, means for closing said lamp-circuit when the target-circuit is broken, and means operated by said armature for opening and closing said lamp-circuit.

6. In a device of the character described, the combination of a target, an electromagnet adapted to hold the same in a normally inoperative position, an indicator lamp, means for automatically setting the target to the danger position and lighting said indicator-lamp when the first car enters the block, and means for flashing or momentarily extinguishing said lamp as each succeeding car enters the already occupied block.

7. In a device of the character described, the combination of a target, an electromagnet adapted to hold the same in a normally inoperative position, an indicator-lamp, means for automatically setting the target to the danger position and lighting said indicator-lamp when the first car enters the block, and means operated by the signal setting magnet to momentarily break the circuit and flash the indicator-lamp as each succeeding car going in the same direction enters the already occupied block.

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Witnesses:

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