

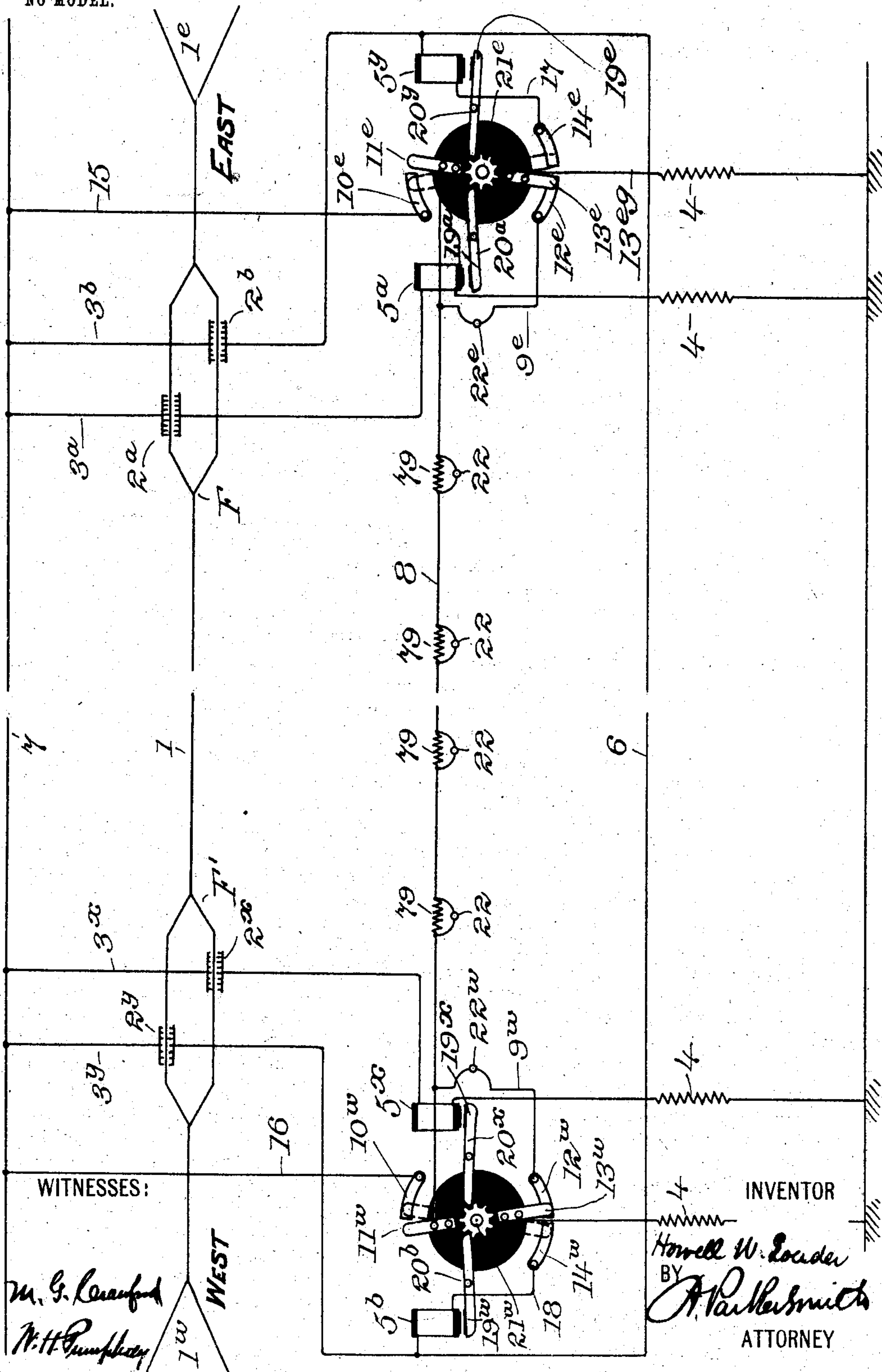
No. 773,039.

PATENTED OCT. 25, 1904.

H. W. SOUDER.
SIGNALING SYSTEM.

APPLICATION FILED OCT. 22, 1902.

NO MODEL.



UNITED STATES PATENT OFFICE.

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SIGNALING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 773,039, dated October 25, 1904.

Application filed October 22, 1902. Serial No. 128,280. (No model.)

To all whom it may concern:

Be it known that I, HOWELL W. SOUDER, a citizen of the United States of America, and a resident of Tamaqua, Schuylkill county, State of Pennsylvania, have invented certain new and useful Improvements in Signaling Systems, of which the following is a specification.

My invention relates in general to electric signaling systems, and more specifically consists of an improved system and apparatus for use on single-track electric trolley-roads which are divided into a plurality of signal-blocks.

The invention herein described contains many of the features of that described in my pending application, Serial No. 99,969, filed March 25, 1902, and more specifically shown in Figure 3 of the drawings of said application, together with certain features of improvement thereon.

The best arrangement of circuits and apparatus at present known to me embodying my invention is illustrated in the accompanying sheet of drawings, it being understood, however, that the circuit-controllers, contact-making devices, &c., are not therein shown in all the details of practical construction.

Referring to the drawings, 1 represents a trolley-wire or portion thereof constituting one block between the turnouts 1^a and 1^w, the said trolley-wire and other wires extending from one end to the other of the block being shown broken away in the middle. At each end of the block adjacent to the turnouts are placed frogs F F', which cause the trolley-wheel to pass to the right hand in whichever direction the car is going, and thereby produce contact with the proper contact device 2^a, 2^b, 2^x, or 2^y.

7 represents the main feed-wire, from which extend branches 3^a, 3^b, 3^x, and 3^y to different parts of the signaling system. The branch 3^a when completed through the contact 2^a extends through the coils of the magnet 5^a and one of the resistances 4 4, &c., to the ground. The branch 3^b when completed through the contact device 2^b extends to the resetting circuit-wire 6 and also by a branch through the coils of the magnet 5^y, wire 17, to the contact-

piece 14^e. The branch 3^x when completed through the contact device 2^x extends through the magnet 5^x and to the ground. The branch 3^y when completed through the contact device 2^y extends to the resetting circuit-wire 6 and by a branch through the magnet 5^b, wire 18, to contact-piece 14^w.

8 is the main signaling-conductor, which extends the length of the block and has a proper number of incandescent electric lamps 22 22, &c., connected in series therewith and also a corresponding number of permanently-closed metallic shunt-circuits 79 79, one about each lamp, of a much higher resistance than the said lamps, said lamps being preferably spaced at approximately equal intervals along said conductor throughout the block. The extremities of said main conductor 8 are connected to the vibrating arms 11^e and 11^w of the circuit-controlling devices located at either end of the block. Branches 9^e and 9^w from either end of the conductor 8 extend to the contact-pieces 12^e and 12^w of said circuit-controllers, and included in said branches are lamps 22^e and 22^w, which preferably have no resistances in shunt therewith. The circuit-controlling devices also have vibrating members 13^e and 13^w, adapted to cooperate alternately with the contact-pieces 12^e 14^e and 12^w and 14^w.

The circuit-controllers are rotated in opposite directions by means of the pivoted levers 20^a, 20^b, 20^x, and 20^y, which cooperate, respectively, with the toothed wheels 21^e and 21^w and are actuated by means of the armatures 19^a, 19^b, 19^x, and 19^y, which are within the radius of attraction of the magnets 5^a, 5^b, 5^x, and 5^y, respectively. The contact-piece 10^e, which cooperates with the arm 11^e of the east circuit-controller device, is connected with the feed-wire 7 by wire 15, and similarly the contact-piece 10^w is connected by the wire 16 with said feed-wire 7.

Preferably the lamps 22, &c., are colored green, while the lamps 22^e and 22^w are colored red.

The operation of my invention is as follows: With the circuit-controllers in the positions shown in full lines the main signaling-con-

ductor 8 is grounded at each end and no current is passing through same. If now a car enters the east end of the block, the motorman, who can see the red lamp 22^e and the first
 5 green lamp 22, will observe that neither of them is glowing and will know, accordingly, that the block ahead of him is empty. After passing the red lamp 22^e the trolley-wheel of his car will take the right-hand branch of the
 10 frog F and close the circuit through the contact-making device 2^a. This will energize the magnet 5^a and rotate the east circuit-controller into the position shown in dotted lines. This completes the circuit through feed connection
 15 15 to main conductor 8 and through branch 9^w thereof to the ground. This causes all the green lamps to glow and also the red lamp 22^w. Accordingly the motorman of a car approaching the west end of the block on the
 20 turnout 1^w will see the red lamp 22^w glowing and remain on the turnout until the first car comes out. The motorman of a car following the first car, however, and approaching the east end of the block will see the first
 25 green lamp glowing, but the red lamp 22^e dead. He will know, accordingly, that there is a car in the block ahead of him going in the same direction and will follow or remain on the switch, according to his instructions.
 30 When the first car approaches the west end of the block, its trolley-wheel will again go to the right side of the frog F' and cooperate with contact device 2^y to complete the circuit through the feed branch 3^y. This will send
 35 the current through the resetting circuit-wire 6 and coils of magnet 5^y, wire 17, contact-piece 14^e, and wire 13^{eg} to the ground. This energizes the magnet 5^y, operates pawl or lever 20^y, and returns the circuit-controller to
 40 the position shown in full lines, thereby cutting out the feed branch and leaving all lamps dead and the system in the condition originally described. If a car backs out of the block, its trolley-wheel takes the right-hand
 45 branch and cooperates with the contact device 2^b or 2^y to produce the same result. If, however, a second car has entered the block trailing the first car, it will have advanced the east circuit-controller one tooth farther. Ac-
 50 cordingly the first car in passing out will set the circuit-controller back only one tooth and not change the connections. The green lamps and the red lamp 22^w will continue to glow, and as the motorman of the first car will see
 55 the red lamp continue to glow after his trolley-wheel has passed the frog F' he will know that one or more cars are trailing him. If one of the lamps 22 burns out, the current will be shunted through its corresponding re-
 60 sistance and the efficiency of the system will remain otherwise unimpaired, each resistance being so graduated with reference to its companion lamp as to permit the flow of sufficient current through it to retain the remaining
 65 lamps in glow and at the same time prevent

the flow of such excess of current as would destroy the remaining lamps. If the red lamp 22^w burns out, it will disable the system for cars traveling from east to west, but will leave
 70 it still operative for cars traveling from west to east—that is to say, when a car enters from the east the green lamps will not light up, the motorman will know that the system is not working, and his instructions will require him to back out and wait on the turnout till
 75 further orders.

The advantages of my invention comprise its cheapness, in that a series connection of the lamps is alone necessary, combined with
 80 avoidance of the total disarrangement of the entire system by the breaking of one lamp, which would follow in other series systems, and the lengthened life of the signal-lamps which results from the slight reduction of
 85 voltage produced by the introduction of the shunt resistances; the completeness of the information given to the motorman as to the condition of the block by the different combinations of the red and green signals; the
 90 freedom of the system from disarrangement when a car is backed out of the block; the capacity of the system to handle any number of cars in the block going in the same direction, and the convenient arrangement of the sig-
 95 nal-lamps such that the motorman always has the important signal in front of him and at no time is required to look back to determine the condition of the block ahead or block be-
 hind him.

It is understood, of course, that various
 100 changes can be made in the details of the constructions employed to carry out my system, such as circuit-controllers, contact-making devices, &c. These have not been illustrated in
 105 working detail, but have been shown in skeleton only. Any convenient form of device for producing the desired making, breaking, and shifting of circuits may of course be employed. The details of the arrangement and coloring
 110 of the lamps may also be varied in certain ways—such, for instance, as in the location and use of shunt resistances, &c.—while still retaining the distinctive features of operation of my invention or some of them.

Having therefore described my invention,
 115 what I claim as new, and desire to protect by Letters Patent, is—

1. In an electric signaling system the combination of a signal-circuit, a plurality of incandescent electric lamps connected in series
 120 in said circuit, and a permanently-closed metallic shunt-circuit about each lamp of considerably higher resistance than said lamp.

2. In an electric signaling system the combination of a signal-circuit, a plurality of in-
 125 candescent electric lamps connected in series in said circuit, and a permanently-closed metallic shunt-circuit about each lamp of considerably higher resistance than said lamp, ground connections at each end of the main
 130

conductor, and a lamp without a resistance-shunt in each of said ground connections.

3. In a signaling system for a railroad divided into a plurality of signal-blocks, the combination of a main conductor extending along each block, a plurality of incandescent electric lamps connected in series with said conductor, a permanently-closed metallic shunt-circuit about each lamp of considerably higher resistance than said lamp, a ground and a feed connection for the main conductor at each end of the block, a lamp without a shunt resistance in each ground connection, and circuit-controlling devices adapted to be operated by a car entering the block to close the feed connection and open the ground connection at the end of the block at which the car enters.

4. In a signaling system for a railroad divided into a plurality of signal-blocks, the combination of a main conductor extending along each block, a plurality of incandescent electric lamps connected in series with said conductor, a permanently-closed metallic shunt-circuit about each lamp of considerably higher resistance than said lamp, a normally closed ground connection at each end of the main conductor, a normally open feed connection at each end of the main conductor, and circuit-controlling devices adapted to be operated by a car entering the block to close the feed connection and open the ground connection at the end of the block at which the car enters.

5. In a signaling system for a railroad divided into a plurality of signal-blocks, the combination of a main conductor extending along each block, a plurality of incandescent electric lamps connected in series with said conductor, a permanently-closed metallic shunt-circuit about each lamp of considerably higher resistance than said lamp, a normally closed ground connection at each end of the main conductor, a normally open feed connection at each end of the main conductor, and circuit-controlling devices adapted to be operated by a car entering the block to close the feed connection and open the ground connection at the end of the block at which the car enters together with an incandescent lamp without a resistance-shunt included in each ground connection.

6. In a signaling system, the combination of a main signaling-conductor, incandescent

electric lamps connected in series with said conductor and spaced at approximately equal distances along the length thereof, resistances also connected in series with said main conductor so as to form shunts around the lamps, ground connections at each end of the main conductor, and a lamp without a resistance-shunt in each ground connection, said lamps in the ground connections being of a different color from those in the main circuit.

7. In a signaling system for a railroad divided into a plurality of signal-blocks, the combination of a main conductor extending along said block, a plurality of green electric incandescent lamps connected in series with said conductor and spaced at approximately equal distances along the length thereof, a normally closed ground connection at each end of the main conductor, a normally open feed connection, circuit-controlling devices adapted to be operated by a car entering a block to close the feed connection and open the ground connection at the end of the block at which the car enters, a red incandescent electric lamp included in each ground connection and located a short distance beyond the last green lamp at each end of the block and a contact-making device for operating the circuit-controlling devices located at each end of the block between the red lamp and the first green lamp.

8. In a signaling system for a railroad divided into a plurality of signal-blocks, the combination of a main conductor extending along said block, a plurality of green electric incandescent lamps connected in series with such conductor and spaced at approximately equal distances along the length thereof, a resistance connected in shunt around each lamp, a normally closed ground connection at each end of the main conductor, a normally open feed connection at each end of the main conductor, circuit-controlling devices adapted to be operated by a car entering a block to close the feed connection and open the ground connection at the end of the block at which the car enters, and a red incandescent electric lamp included in each ground connection.

Signed at Lansford, Pennsylvania, this 2d day of October, 1902.

HOWELL W. SOUDER.

Witnesses:

JNO. W. WERNER,
E. E. WERNER.