

C. E. BUZZELL.
ELECTRIC RAILWAY SIGNAL.

No. 464,490.

Patented Dec. 8, 1891.

Fig. 1.

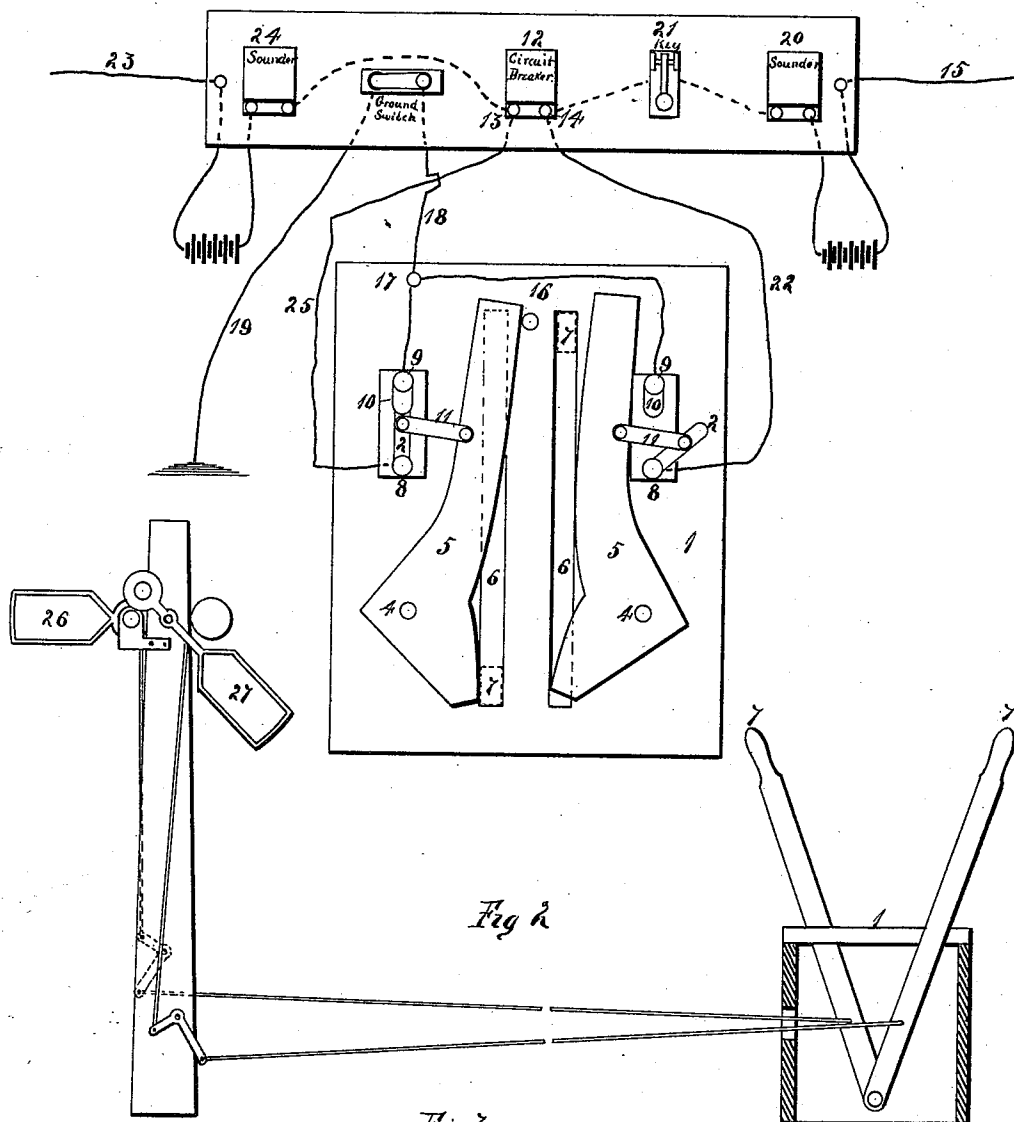
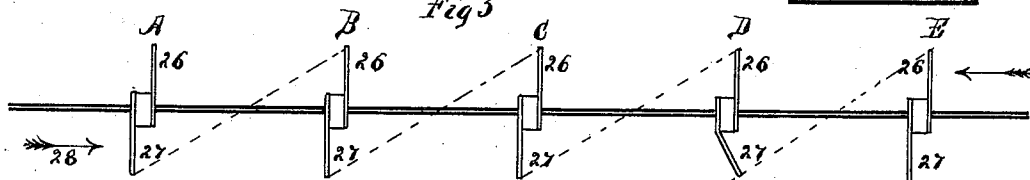


Fig. 2.

Fig. 3.



Witnesses:
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L. L. Miller.

Inventor:
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Att'y.

(No Model.)

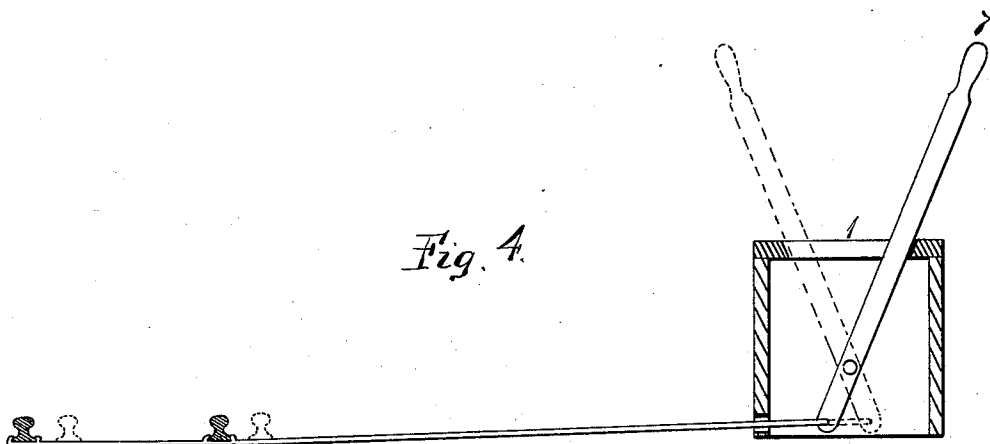
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Fig. 4.



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UNITED STATES PATENT OFFICE.

CHARLES E. BUZZELL, OF LEAF RIVER, ILLINOIS.

ELECTRIC RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 464,490, dated December 8, 1891.

Application filed June 20, 1891. Serial No. 396,991. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. BUZZELL, a citizen of the United States, residing at Leaf River, county of Ogle, and State of Illinois, have invented certain new and useful Improvements in Electric Railway-Signals, of which the following is a specification.

The object of my invention is to provide an arrangement of electrical circuits and apparatus for railway operative uses, whereby the actual position of railway-switches, semaphores, and block-system signals may be automatically indicated at any desired point or points on an electrical circuit, and errors in operating the same upon the part of operators through negligence or forgetfulness automatically avoided, prevented, or indicated in ample time to prevent collision or derailment of trains.

My arrangement includes an electrical circuit, electric bells or telegraph-sounders, electrical switches, and a device whereby the movement of the semaphores, arms, track-switches, or block-signals, or levers operating the same will be communicated to the electrical switches, causing the circuit to be opened and closed by said movement, also throwing into the circuit by said movement an automatic circuit-breaker, causing the circuit to be automatically broken, thereby preventing its use for telegraphic purposes and causing an alarm to be sounded on all electrical instruments connected on the circuit, indicating that the position of the semaphore, switch, or block-signal has been changed, and preventing the use of the circuit for the purpose of reporting semaphore, switches, or block-signals in proper position when in fact they are not in such positions.

Figure 1 is a diagram of the circuit arrangement for a double-circuit two-arm block-signal system with a general view of the apparatus connected therewith. The device frame is therein represented as detached and inverted. The instruments are located upon the operating-table and the circuit arrangement is as therein shown. Fig. 2 is an elevation of a semaphore-signal and a vertical section of the box inclosing the levers for operating the semaphore. Fig. 3 is a representation of the circuit arrangement of a railway-block-signal system. Fig. 4 is a vertical

section through the box inclosing the lever and shows its connection with a railway-switch.

The device frame can be used as and takes the place of the top or cover 1 of the box usually inclosing the levers for operating the semaphores, railway-switches, or block-signals. Attached to the under side of this frame upon pivots 4 are secured two rocker-arms 5, in length and width sufficient to cover the slots 6, cut in the frame to allow the levers 7 to project through and move free therein. The rocker-arms 5 may be of any desired thickness, and the face of that portion which comes in contact with the levers 7 are formed at such an angle that the movement of the levers in the slots will cause the ends of the rocker-arms to move across the slots, being securely held in whatever position the lever movement may cause them to be in. The rocker-arms are pivoted nearer one end than the other, and the end having the shortest angle presented toward the slot being taken for the closed or normal position of the lever operating the semaphore or block-signal. It will be noted that in this position the lever has to move but a fraction of the slot distance before moving the opposite end of the rocker-arm clear of the slot, and this end of the rocker-arm thus opened is not closed until the lever be moved entirely back to its normal or closed position.

Attached to the frame in any desired position to clear the movements of the rocker-arms I secure an ordinary one-point electrical switch or the metal portions thereof, consisting of binding-posts 8 and 9, contact point or plate 10, electrical switch 2, pivoted at binding-post 8, mechanically connecting the electrical switch-lever 2 with the rocker-arms 5 by means of a connecting strap or lever 11 in such a manner that the electrical switch-lever 2 will be opened and closed by the movement of the semaphore-lever 7 in connection with the rocker-arms 5 and connecting-bar 11.

I locate on the operating-table an automatic circuit-breaker 12, connecting electrically its two binding-posts 13 and 14 with the binding-posts 8 of the electrical switches. The main-circuit wire 15 is connected to binding-post 14 of the circuit-breaker 12. The

contacts 10 are electrically connected with each other through binding-post 9 and wire 16, which is electrically connected through binding-post 17 with the earth. This circuit 5 passes through a one-point ground-switch located upon the operating-table or other convenient point, and by wires 18 and 19 connects the binding-post 17 with the ground.

Referring to the circuit arrangement of Fig. 1, the main-line circuit 15 passes to sounder 20, thence through the key 21 to binding-post 14 of the circuit-breaker 12, thence by wire 22 to binding-post 8 of the electrical switch on the east side of the device, whose arm or lever controls that portion of the block covered by the circuit 15 from post 8, through the switch 2, (if closed,) and thence along the line 16 to binding-post 17, to earth by wires 18 and 19 and the ground switch. The main-line circuit 23 passes to sounders 24, thence to binding-post 13 of the circuit-breaker, thence along 25 through electric switch connected with west rocker-arm 5 to post 17 and to earth, moving the signal arm or lever protecting block-circuit 15 to an open position, opens the electrical switch on the device and throwing the electrical current through the circuit-breaker, thence along the line 25 through binding-post 17 to earth, this circuit being 30 automatically opened and closed by the circuit-breaker during the open position of said rocker-lever. I derive similar results by opening the arm or lever protecting block-circuit 23. The circuit being opened at the electrical 35 switch 2, passes through circuit-breaker, and by way of wire 22, electrical switch 2 on the east side, and wire 16 to binding-post 17, and thence to earth. The opening of both arms or levers at the same time cuts off the ground and 40 joins the two circuits through the circuit-breaker, making one circuit, it being automatically opened and closed, sounding an alarm on all sounders located on the two circuits thus joined, and preventing their use for ordinary 45 telegraphic purposes, while the block-signal protecting them is in an open position. The opening of the ground-switch will also join the circuits through the device, (providing the levers are in a closed position.) The circuits 50 thus joined can be worked by the one key.

Care should be taken in the battery arrangement of the two circuits to see that they are so placed that opposite poles will be thrown together when two or more circuits are joined.

Fig. 3 represents the circuit arrangement for a railway-block-signal system, A, B, C, D, and E being block-stations, the track between the two stations comprising a block, 26 and 27 being the two-way signal-arms at each station, the arm 27 at each station being electrically connected with the arm or lever 26 of the next adjoining station, as represented in dotted lines in Fig. 3. Thus the two arms protecting any one block are in electrical 65 connection. The opening of the block-signal at one end of the block is automatically indicated by an alarm sounded upon the sounder

at the other end of the block. For example, at station D, the arm 27 being opened, the circuit D to E is automatically broken, sounding an alarm on the sounder at D 27 and 70 sounder at the station E 26, located in the same circuit. If the operator at D be required to report to station E the entrance of a train into the block between stations D and E in 75 the direction indicated by arrow 28, he must first close the block-signal, thus protecting the train in the block before he can do so. Failing to close it, his own sounder, also the sounder at E, will continue to alarm, calling 80 the attention of both operators to the open arm at D. If the operator at E be required to obtain from operator at D his understanding of the position of the signal before he allows trains to enter the block D E at E, the 85 block not being properly protected at D, the circuit is being automatically opened and closed by the circuit-breaker and prevents its use for obtaining the required understanding. Hence the operator at E can hold trains back 90 and out of the block until it is properly protected. Should a block be properly protected at both ends, the opening of either arm will be followed by an instantaneous alarm upon both sounders on that circuit. Hence when 95 so followed by an alarm is positive indication that the companion arm protecting the other end of the block is in a proper protective position. As this circuit-breaker is cut into the circuit only by the movement of the signal- 100 arms, line defects or telegraph-signals will not sound an alarm.

The manner of using the arrangement and apparatus thus described in connection with a railway-block-signal system is preferably 105 as follows: The normal positions of the block-signals or semaphores to be at "closed" or "danger"—this position to be changed only when it is desired to allow a train to enter a clear block. The operator in charge of block- 110 stations is to notify the operator at the other end of the block that he is about to allow a train to enter it at his station and obtain his understanding before he opens the block. This being obtained, he opens the block-signal 115 to allow the train to enter and closes the block-signal behind the train. He then opens the ground-switch and reports the entrance of the train into the block to the two stations upon the circuits thus joined, then immediately 120 closes the ground-switch, operators being required, if upon opening a block-signal lever one-half way an instantaneous alarm be not obtained upon their own sounder, (the one in electrical connection with the block-signal being opened,) to immediately close 125 the signal-lever and not allow the train to enter until the block be properly protected at the other end, as failure to obtain an alarm is indication that the block-signal at the 130 other end is opened.

I claim as my invention—

1. The combination of a suitable appliance for actuating a railway switch or signal, a

normally-closed electrical main circuit in which is included instruments suitable for telegraphic purposes, a battery, and an automatic circuit-breaker, an electrical switch in
5 a circuit normally rendering said automatic circuit-breaker inoperative, said electrical switch opened and closed by the movement of the actuating appliances.

2. The combination of an actuating appliance for railway switch or signal, a main electric circuit in which is included a battery and electrical switch, said electrical switch opened and closed by the movement of the actuating appliances, and a circuit-breaker in a circuit
15 shunted by the electrical switch, so that when the electrical switch is closed the circuit-breaker will be inoperative, but upon the opening of the electrical switch the circuit-breaker will automatically break and make
20 the main electrical circuit.

3. The combination of a lever for operating a railway switch or signal, an electrical circuit, an electrical switch operated by the movements of the lever, two sounders, a key, a battery, and a circuit-breaker located in the
25 circuit.

4. The combination of a lever for operating a railway switch or signal, a main electric circuit in which is included a key, two sounders, battery, and an electrical switch which
30 is opened and closed by the movements of the lever, and a circuit-breaker in a circuit shunted by the switch, so that when the switch is closed the circuit-breaker will be inoperative, but upon the opening of the switch
35 the circuit-breaker will become active.

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