

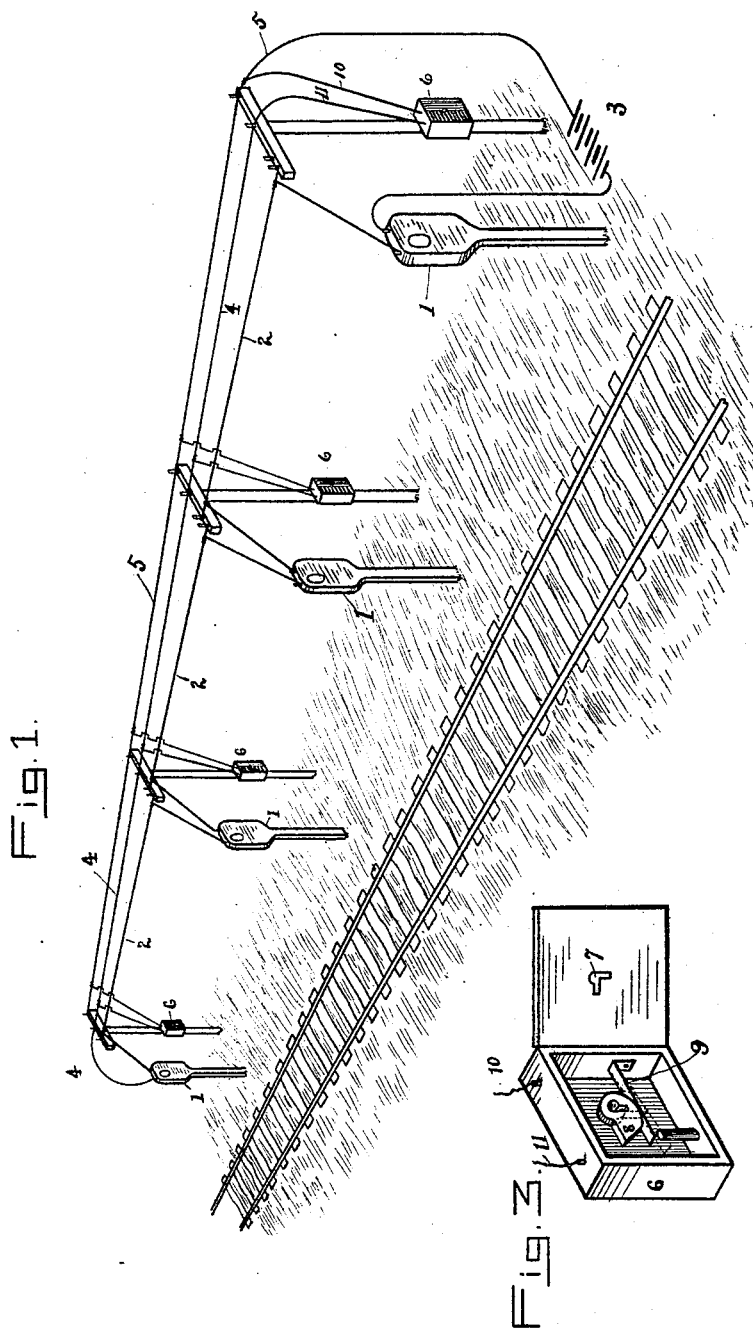
(No Model.)

2 Sheets—Sheet 1.

L. F. MUNGER.  
RAILWAY SIGNAL.

No. 457,855.

Patented Aug. 18, 1891.



WITNESSES:  
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Fig. 2.

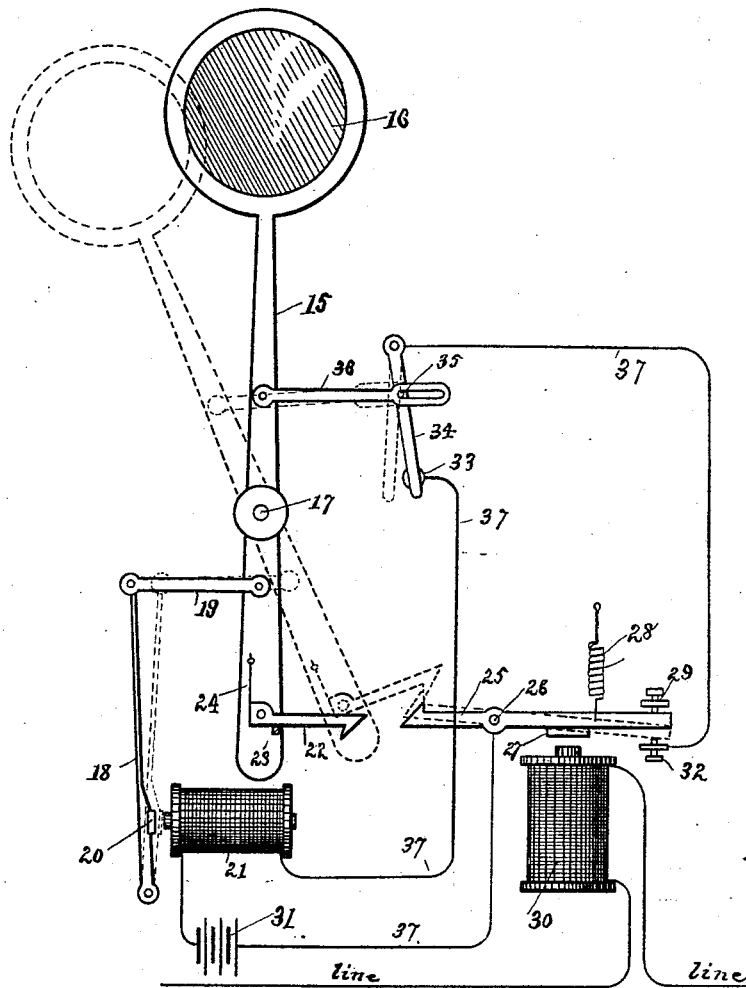
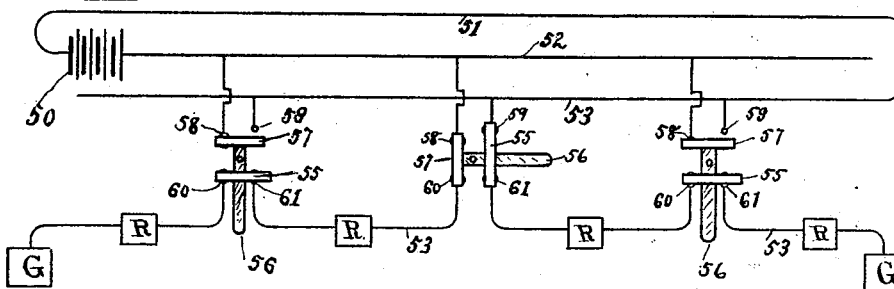


Fig. 4.



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# UNITED STATES PATENT OFFICE.

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TO THOMAS A. SMYTH AND JAMES H. MCCARTNEY, OF SAME PLACE.

## RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 457,855, dated August 18, 1891.

Application filed January 15, 1891. Serial No. 377,870. (No model.)

*To all whom it may concern:*

Be it known that I, LYMAN F. MUNGER, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Railway-Signals; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawing, forming a part of this specification, and to the figures and letters of reference marked thereon.

My present invention relates to semaphores or signals operated by electricity adapted particularly for use on railways or similar places, and has for its objects to provide a device that is simple in construction and operation and can be readily employed and operated without the expenditure of great battery-power and without the necessity of maintaining a charged main line, and, further, one that can be readily employed on long lines embodying a number of such signals, whereby in the event of a train becoming disabled or unable to proceed from any cause signals may be operated at any one of a number of points and all trains entering or within the block or area covered by the signals will be warned in time to prevent a collision without relying upon a train-man to proceed down the track with a lantern or flag.

To these and other ends, hereinafter mentioned, the invention consists in certain novelties of construction and combinations of parts, all as will be fully described, and the novel features pointed out more particularly in the claims at the end of this specification.

In the drawings—

Figure 1 represents a portion of the line of a railway provided with my improvements; Fig. 2, a view of a signal or semaphore constructed in accordance with my invention; Fig. 3, a view of a key-switch or signal-box, and Fig. 4 a view of modified circuit arrangements.

Similar figures and letters of reference indicate similar parts.

In carrying out one portion of my invention I preferably divide the line of railway into sections, the ends being indicated by the stations or stopping-places at which persons in the employ of the railway are located, and pro-

vide a circuit or circuits extending between the termini of the sections and connected with suitable semaphores or signals, which circuit or circuits may be so manipulated by an authorized person as to cause the operation of all the signals within the section and warn the engineers of trains already in the section, or which afterward may come in, to stop or proceed with caution.

The first figure of the drawings shows a series of signals or semaphores represented by 1 included in series in a circuit or line wire 2, extending from the main-line battery 3, located at a station or other suitable place. From the last signal 1 a return conductor 4 extends parallel with another wire or conductor 5, which latter is connected to the other terminal of the battery.

Interposed between the two conductors 4 and 5, which represent the terminals of the battery-circuit, are disposed a series of signal boxes or switches 6, preferably constructed as shown in detail in Fig. 3 and adapted to be operated by an ordinary switch-key, so that any train-man, when necessary, may insert his key in the aperture 7 in the door of the box (which door is of course normally closed and secured by suitable fastening devices) and by turning the cam-block 8 connect the spring switch-arm 9 with the contact-pin, as shown in dotted lines, Fig. 3, said arm and pin being connected to the wires 10 and 11. In order that there may be no mistake made as to the direction in which it is necessary to turn the key, I preferably paint red the side of the containing-box or the door toward which the key must be turned to set the signals to "danger," so that the train-man has only to insert his switch-key and move it toward the color he wishes to exhibit on the semaphores.

In Fig. 2 is shown the details of my improved semaphore, all the parts of which are located in the casing 1, but being here separated somewhat to exhibit more clearly their construction and mode of operation. The lever or arm 15, carrying the signal disk or target 16, which latter is preferably translucent and colored red, is pivoted at 17, and its lower end is slightly heavier, so that its normal position will be as in full lines, with the disk out of line with the opening in the cas-

ing, showing a white light at night and an open space or a white target by day. 18 indicates a lever pivotally supported at its lower end and connected by a link 19 with the target-arm, in the present instance below the pivot, and secured to said lever is an armature 20, operated upon by an electro-magnet 21, which latter when energized by a current draws the lever over and moves the target from "safety" to "danger." In order that the motion of the armature may be more or less gradually transmitted to the target-lever, I preferably construct the upper part of the lever 18 of somewhat springy material to take up the shock, or instead of this an elastic connection may be made between said lever and the arm 15 in place of the rigid link 19. Upon the target-arm 15 is arranged a catch or hook 22, actuated in one direction and held against a stop 23 by a spring 24, which catch is adapted to engage the correspondingly-hooked end of a relay armature-lever 25, pivoted at 26 and provided with an armature 27, a retracting-spring 28, and a back-stop 29. The relation between the catch 22 and the hook of the armature-lever is such that when the target-lever is swung over toward it, if the armature-lever is drawn down by its magnet 30, as in dotted lines, Fig. 2, the hook 22 will slide up and become engaged with its end; but when the armature is not attracted the catch 22 will not become engaged. Within the semaphore or signal-casing is arranged a battery 31 (preferably of dry cells, such as are in ordinary use) and a local circuit 37, including electro-magnet 21, armature-lever 25, contact-pin 32, and a switch embodying a button 33 and a movable tongue or arm 34. This switch-arm 34 is in the present construction provided with a pin 35, entering a slot in a link 36, pivoted to the target-lever 15 above its pivot, so arranged that when the latter is in normal safety position the arm and button are in contact and the circuit completed at this point; but when the target is swung over to the "danger" position the arm is moved off the button and the circuit broken, as in dotted lines, this break being made just before the target reaches its extreme movement. In normal position the armature-lever 25 is in contact with stop 29, being held thus by spring 28, and the local circuit broken between said lever and contact-pin 32. The relay-magnets 30 of each of the semaphores are interposed in the line 2 from battery 3 in series, so that a current on the line will energize all said magnets and set all the semaphores at "danger" through the means just described and in the manner about to be described. Assuming all the semaphores at the position of "safety," as in full lines in Fig. 2, indicating the line clear, if for any reason a train should become disabled or a section-hand should discover a fault in the road-bed incapable of being at once remedied, any of the train-men or other

authorized person having a switch-key would repair to the nearest signal-box 6 and, inserting his key, turn the switch and close the main circuit through battery 3. Referring now to Fig. 2, this would cause the armature 26 to be drawn down and the local circuit closed between the lever 25 and pin 32, and soon as the magnet 21 was energized it would attract its armature and through lever 18 move the target to the "danger" position in dotted lines. The catch 22 would slide up the end of lever 25, and its spring pressing it down would hold said target-lever displayed. Just as soon as the catches are engaged the switches 34 will be moved off buttons 33 and the local circuit broken; but as the armature 27 is still attracted the target will be held displayed without wasting the local battery, which simply gives the initial impulse. The signals will now be retained in position as long as the main circuit is closed, and when the "danger" is removed the person setting the signals, or any one else provided with a similar key, can, by operating the switch first actuated, return the signals to normal position, the retraction of armatures 25 by their springs disengaging catches 22 and permitting the target-arms 15 to assume a vertical position, as before, the local circuit being re-established at switch-arm 34 by this. I prefer to employ the circuit arrangement shown in Fig. 1, for the reason that it will be noted that no matter where the circuit is closed it will be the same length, also that there is no liability of short-circuiting or leakage, and by the employment of an open circuit with the main battery at a station the battery can be taken care of more readily and need not be very strong. By the employment of local batteries at the signals in the circuit that as soon as completed and the signal set, is broken again, and by mechanical retaining devices I am enabled to leave the batteries longer without attention than where they not only actuate but hold the signals. Instead, however, of employing the circuit arrangements of Fig. 1, I may employ such a one as shown in Fig. 4, in which the main-line battery 50 is provided with one long wire 51 and a short one 52, and the line-wire 53, including the semaphore-relays R, is broken at each switch, though said break is normally bridged by one strip 55, extending between contacts 60 61 (on a switch-lever 56) when in normal position. The switches, as before, are located by the side of the track in suitable boxes and each embody two metallic strips 55 and 57, insulated, while the terminals of the battery-lines 52 and 51 are at buttons 58 and 59. The ends of the line 53 are grounded or may be connected to a return metallic circuit, if desired. To operate the signals in this arrangement it is only necessary to turn one of the switches up, as is the middle one shown, when the strip 57 will connect contacts 58 and 60, and strip 55 contacts strip 59 and 61, thereby sending the current through all

the signal-relays in both directions, as will be understood, to the ground-terminals G or a return metallic circuit.

I do not wish to confine myself to the arrangements of parts or circuits shown, as the details in Fig. 2 could be modified without departing from the spirit of my invention, and the signal as well be used on an open circuit by simply locating the magnet 30 on the other side of the relay armature-lever, a suitable spring or weight being employed to draw the lever away from its magnet.

It will be noted that the local circuit and the signal-actuating devices embodying the electro-magnet is merely one form of actuating mechanism for the signal, which is controlled both as to the operation of the signal and its retention by the relay, which only requires a slight current.

I claim as my invention—

1. The combination, with a main line connected at one end to a battery and a series of signals arranged in series therein, of two parallel conductors, one a continuation of said line and the other connected to the battery, and switches arranged between said parallel conductors for connecting them and operating the whole series of signals, substantially as described.

2. The combination, with a way or track, a series of signals disposed along said way, a main line in which the signals are arranged in series, and a battery connected to said line, of two parallel conductors extending along the way, one connected to the main line and the other to the battery, and a series of switches inclosed in suitable boxes and accessible to authorized persons, also placed along said way and arranged to close the circuit through the main line at any point, substantially as described.

3. The combination, with the signal-arm, an electro-magnet for actuating it, a catch for retaining the arm when actuated, a circuit embodying said electro-magnet, and a switch for controlling said circuit, of an electro-magnet controlling the said catch and the switching device, substantially as described.

4. The combination, with the signal-arm, an electro-magnet for actuating it, a catch for retaining the arm when actuated, a switch operated by the said electro-magnet, and a circuit embodying said magnet-switch and a second switch, of actuating devices for said last-mentioned switch, controlling also the operation of the catch, substantially as described.

5. In a signal, the combination, with a signal-arm, a catch for retaining it when actuated, an electro-magnet for operating the signal-arm, a switch controlled by said magnet,

and a local circuit embodying said magnet and switch and another switch, of a main circuit and an electro-magnet therein controlling said last-mentioned switch and also the signal-retaining catch, substantially as described.

6. The combination, with the series of signals, each embodying a signal-arm, actuating devices for automatically moving said arm and displaying the signal, and a catch for holding the signal displayed, of a series of electro-magnets, one for each signal, arranged to control the actuating devices and the catches, a main-line circuit containing said magnets in series, and a battery and switches for controlling said circuit, whereby upon the operation of any of the switches all of the signals will be operated and held in operative position, substantially as described.

7. The combination, with the signal-arm, the electro-magnet for actuating it, the catch for retaining the arm, and the local circuit embodying the electro-magnet and the contacts of a relay, of a relay with its coils in a main circuit controlling the operation of the catch and the local circuit, substantially as described.

8. The combination, with the signal-arm having the catch thereon and actuating devices therefor, of the electro-magnet having the armature-lever normally out of the path of said catch, but adapted when actuated to be brought in its path, said armature-lever controlling by its position the signal-actuating devices, substantially as described.

9. The combination, with the signal-arm having the catch thereon, a local circuit embodying an electro-magnet, which latter actuates the arm, a switch operated by the magnet to break the circuit when the arm is at the end of its movement, and a catch co-operating with the one on the signal-arm normally out of the path of the latter, of an electro-magnet controlling the last-mentioned catch and operating a switch in the local circuit to change the latter when the catch is in operative position, substantially as described.

10. The combination, with the local circuit, the signal-arm, the armature-lever connected thereto, the switch in the local circuit connected to the signal-arm, and the magnet in the local circuit, of the relay-magnet, the armature-lever having the hook on its end, the catch-hook on the signal-arm, and the contact with which said armature-lever engages, the contact and lever completing the local circuits, substantially as described.

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