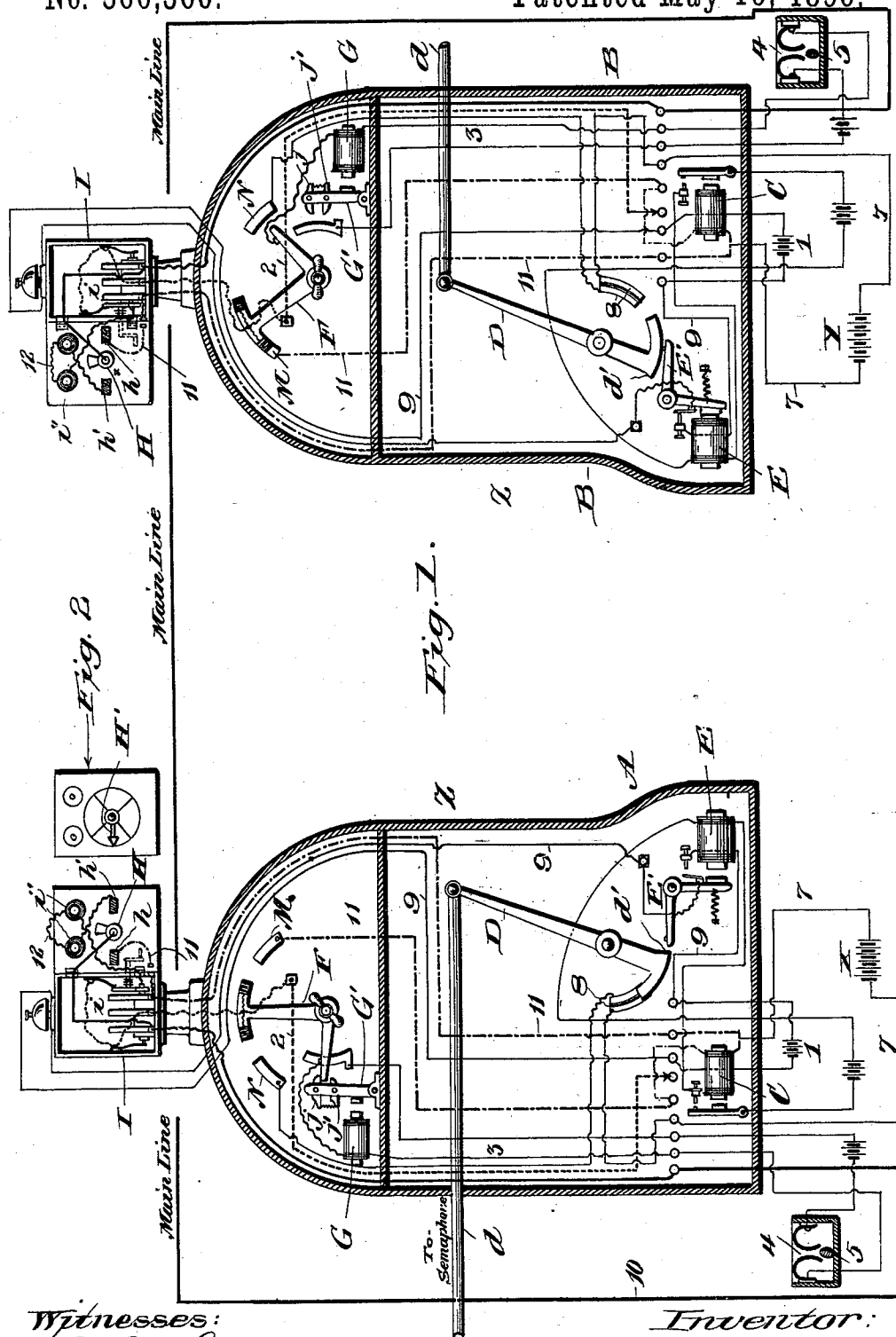


(No Model.)

M. B. LEONARD.
ELECTRICAL APPARATUS AND SYSTEM.

No. 560,360.

Patented May 19, 1896.



Witnesses:

L. C. Hills.
Treasurer

Inventor:

Michael Barry Leonard,
by ~~Michael Barry~~ ^{his Atty.}

UNITED STATES PATENT OFFICE.

MICHAEL BARRY LEONARD, OF RICHMOND, VIRGINIA.

ELECTRICAL APPARATUS AND SYSTEM.

SPECIFICATION forming part of Letters Patent No. 560,360, dated May 19, 1896.

Application filed February 19, 1895. Serial No. 538,958. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL BARRY LEONARD, a citizen of the United States, and a resident of Richmond, in the county of Henrico and State of Virginia, have invented certain new and useful Improvements in Electrical Apparatus and Systems, of which the following is a specification.

My invention relates to a block-signaling system of the general kind set forth in my Letters Patent No. 517,419, of March 27, 1894—a system in which the signal-lever at one station is locked by instrumentalities operated to release the lever by means of a magnet or relay, termed by me the “unlocking-magnet,” included in an electric circuit controlled by the operator at another station. Under this arrangement it is necessary for the operator who desires his signal-lever to be unlocked to telegraph for this purpose to the operator at the other station. It is my object to so arrange things that one and the same line-wire which extends between the two stations may be used not only as a part of the unlocking-circuit, but also as a medium of communication between the operators at the two stations, thus saving the cost of erection and maintenance of a second wire for this purpose.

I will first describe my improvements by reference to the accompanying drawings, and will then point out in the claims those features in which my invention is comprised.

In the drawings, Figure 1 is a sectional elevation of the apparatus used at two intercommunicating railway block-stations, together with a diagrammatic representation of the circuits. Fig. 2 is a view of the front of one of the magneto-bell boxes.

The particular apparatus and system in connection with which my present invention is illustrated are the subject of another application in my name for Letters Patent, filed November 10, 1894, Serial No. 528,832.

The apparatus at both stations are the same, so that a description of one will answer for both.

Z is the box containing the apparatus.

D is the pivoted signal-operating lever, actuated by any suitable means and connected to the semaphore or other signal by rod *d* and other suitable intermediaries.

E' is a bell-crank armature-lever pivoted

at its elbow and having its upper horizontal limb arranged to act as a stop to engage the heel *d* of the lever D when the latter is in normal or danger position, as at station A, thus locking it against movement.

E is a magnet, termed by me the “unlocking-magnet,” which when energized attracts armature E' and thus draws the horizontal limb of the armature down out of the path of the lever D, so as to release said lever. Said magnet may, if preferred, be directly connected to line; but I prefer to include it in the circuit of a local battery 1, which circuit is closed through normally open contacts controlled by a small line-relay C.

F is the pivoted ground-switch, adapted to play between two contacts M N. It normally contacts with M, toward which it is drawn by a spring (not shown) and has a ground connection through wire 2. For this purpose its two contact ends (which are insulated from each other) have a common ground, being connected to the wire 2, which leads to the “ground-post,” the latter being indicated by the conventional small circle surmounted by the downwardly-pointing arrowhead. The switch F in returning from the N to the M contact is locked in intermediate neutral position out of electrical connection with either contact by means of a switch-locking armature-lever G', provided with pivoted dogs or jaws *j j'*, between which at this time the detent-arm of said switch is held, as shown at station A. The armature-lever G' is drawn in a direction to release the switch by an electromagnet G, included in a circuit 3, completed through normally open contacts 4, controlled by a circuit-closing track-lever 5 to be located near the track in a position to be operated by a passing train, the result being that after the switch at A has been moved to release B's signal-lever it cannot be again operated until after the train admitted to the block has passed the track instrument at A.

At each station there is a main battery—X for A and Y for B—one pole of each being connected by wire 7 to the contact-plate N at the same station with it, and the other pole being connected to line 10, (indicated by the dark solid line.) In wire 7 are contacts 8, closed by the toe of the signal-operating le-

ver D only when the latter is in normal position, as at A station, the object of this being to compel the operator at one station to put his own signal to "danger" before he can release the signal-operating lever at the other station. As a further safeguard, a bell-circuit 9 is provided completed through contacts closed by the armature-lever E', so long as the signal-lever D is not in normal position, as seen at station B, thus causing a continuous ringing of the bell for the purpose of warning the operator. Each contact M is connected to line through a wire 11, (indicated by dash-and-dot line,) which includes the relay C. Thus far the system resembles that described in my aforesaid application, Serial No. 528,382. Assuming both ground-switches to be in normal position resting upon their contacts M and both levers at D normal, then if B operator, in response to a call to that effect from A station, moves his switch from M to N the circuit will be from B's ground through ground-switch contact N, wire 7, battery Y to line, thence to A station through relay C at that station, thence to plate M and through ground-switch to A's ground, with the result of energizing the unlocking-magnet E at A station, and consequently releasing A's signal-operating lever.

Now in order to make use of the line between the stations as a medium of communication also I proceed as follows: I provide at each station a switch H and a pair of contacts h h' , with one or the other of which it can make electrical contact, according to the direction in which it is turned. The line is connected to the switch H. The one contact, h , is connected to the wire 11 in the circuit of the relay C, and the other contact, h' , is in the circuit 12 of a signaling or telegraphic instrument. What I prefer for this purpose is the ordinary magneto-bell call, which I have illustrated in a general way in the drawings, I being an ordinary magneto-bell box surmounting the box Z. i is the magneto and i' the bell-magnets, with the usual connection between them (the magneto and the magnet) and the contact h' on the one hand and ground on the other. The switch H and contacts h h' are mounted on the inside of the door of the box, which in Fig. 1 is represented as thrown open. In this position of the door the wire 11 is interrupted at the point where it passes from the box to the door; but when the door is closed, as it must be when the apparatus is in use, then the continuity of the wire is restored by the meeting of the contacts with which its ends on the door and box are provided. The spindle of the switch projects through to the front of the door, Fig. 2, and is there provided with a knob and a pointer H' to indicate the position of the switch.

The switch at each station normally is in connection with contact h' , thus completing

the call-circuit and permitting communication to be carried on by a code of bell-signals. When it is desired to unlock a lever at one station, the operator at that station makes a suitable call, which is acknowledged by the operator at the other station, after which the switches H at both stations are at once turned to make connection through contacts h with the unlocking-circuit at the station where the lever is to be released, and then the operation proceeds as hereinbefore described.

This method of signaling—viz., by magneto-bell calls—is preferred by me, for the reason that it is impracticable to unlock the semaphore-lever by the alternating currents generated by the magneto should the releasing-operator fail to turn his switch H to unlocking position and try to release the lever at the other station by the magneto-current instead of by the ground-switch in the usual way. The reversals of current do not admit of the magnetic effect necessary for unlocking purposes, and especially is this the case when, as in the plan illustrated in the drawings, a small line-relay is used to control contacts in the local circuit of the unlocking-magnet.

Having described my invention and the best way now known to me of carrying the same into effect, what I claim herein as new, and desire to secure by Letters Patent, is—

In a block-signaling system substantially as described, two stations each equipped with call or signal appliances and electric connections therefor, and signal-lever-locking appliances, an unlocking relay or magnet, circuit connections therefor, and a battery, included in said circuit connections in a shunt to the unlocking-magnet at the same station, for energizing the unlocking-magnet at the other station in such manner that when the circuit is through one battery the unlocking-magnet at the same station will be cut out and vice versa in combination with a line-wire extending between and terminating in a switch at each station, and two contacts controlled by each of said switches, the electric connections in which the call appliances are included terminating at one end in one of said contacts, and the electric connections including the unlocking-magnet terminating at one end in the other of said contacts, and one or the other of said circuits being continued through the line-wire according to the position of the switch, and being completed only when both switches are on corresponding contacts, substantially as and for the purposes set forth.

In testimony whereof I have hereunto set my hand this 15th day of February, 1895.

MICHAEL BARRY LEONARD.

Witnesses:

J. M. POWERS,
W. W. TALLEY.