

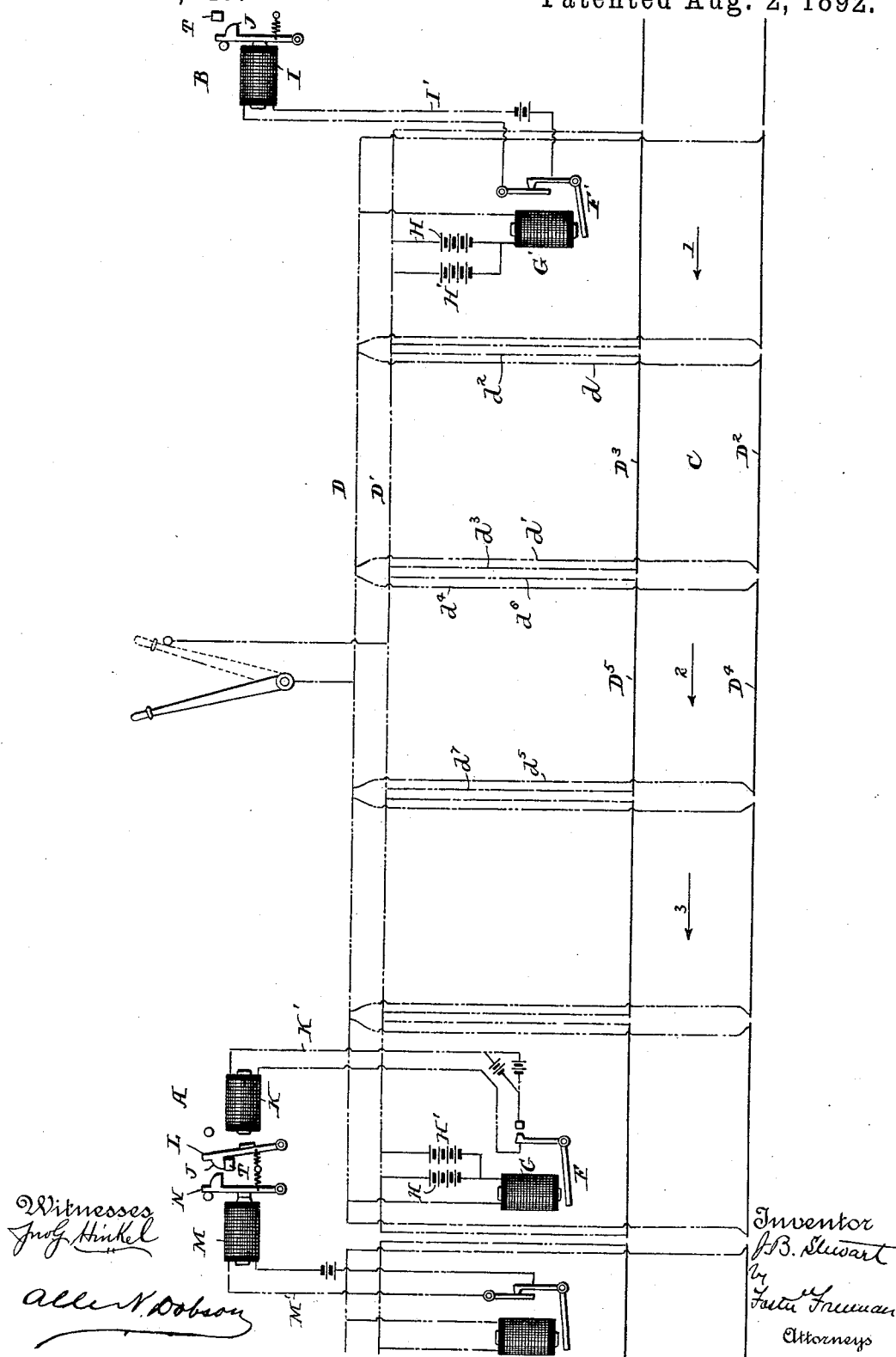
(No Model.)

J. B. STEWART.

AUTOMATIC DEVICE FOR ELECTRIC BLOCK SIGNALS.

No. 480,147.

Patented Aug. 2, 1892.



UNITED STATES PATENT OFFICE.

JOSEPH B. STEWART, OF HAVERSTRAW, NEW YORK.

AUTOMATIC DEVICE FOR ELECTRIC BLOCK-SIGNALS.

SPECIFICATION forming part of Letters Patent No. 480,147, dated August 2, 1892.

Application filed January 26, 1892. Serial No. 419,351. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH B. STEWART, a citizen of the United States, residing at Haverstraw, in the county of Rockland and State of New York, have invented certain new and useful Improvements in Automatic Devices for Electric Block-Signals, of which the following is a specification.

My invention relates to electric railway-signals, and more especially to automatic devices for locking and unlocking the signal-levers of an electric block-signal system, so that they can only be moved by the signal-operator when unlocked and are incapable of being moved by him when locked, thus preventing him from making a mistake in signaling a line clear when a train is in the section.

To these ends my invention consists in the construction and arrangement of circuits and connections, substantially such as is hereinafter more particularly pointed out.

In the accompanying drawing I have shown a diagram of the preferred arrangement of circuits and connections whereby these objects may be accomplished. I have not herein illustrated the system of moving the signal-levers, as that is well understood, and my invention may be applied to many and various electric-signal systems, and especially to that class in which there is a lock controlling the movement of the signals, which may be automatically controlled by the train. It is understood, of course, that the track is divided up into block-sections in the usual way, having signals at the ends of the blocks, which may be operated from a tower or other signal-station mechanically or electrically.

In the accompanying drawing I have shown a single section of the railroad, having signals A and B at the ends of the block.

The rails of the track C between the signals, are divided into several sections or divisions, as 1, 2, and 3, and arranged along the track is a closed electric circuit, the conductors D and D' of which include the magnets G and G', located adjacent to each signal-lever. Included in the circuit at each end are two batteries H H', both feeding into the same conductor D', so that in case one battery should fail the other would supply the

current. These batteries are put to line in opposition—that is, for instance, the zinc plates of the batteries are directly connected, so that normally the currents from the batteries at each end of the line will neutralize each other and the magnets G and G' will not be energized.

The armatures F F' of the magnets are normally in their open positions, as indicated in the drawing, and at station B, I have shown the magnet I as being controlled by the local circuit I' by means of the armature F', the circuits being so arranged that when the armature F' is down the local is closed and the magnet I is energized by the local battery, thus drawing the armature J against the pole of the magnet. This armature is adapted to control the lock or other controlling device of the signal, and it is arranged so that when the armature is in the position shown at station B the signal is unlocked and can be moved by the operator.

As shown, the armature is provided with an extension S, adapted to engage the lever T, and one edge of the extension is beveled, so as to permit the lever being moved back to place even when the extension is out, it being forced back by the lever similar to a door-latch. The armature F, as before stated, is also normally away from the magnet G, and the circuit K' of the local magnet K is controlled by this armature, but it is normally open, and the armature L is away from the local magnet K, and this controls the signal or locks the levers against movement by the operator.

I provide two local circuits at each station, as shown at A, in which the magnet M in the local circuit M' is controlled by the armature F² in the next electric circuit or block, and the circuits and action are the same as at station B. With the armature F² away from its magnet, the magnet M is energized and its armature N is held in contact with the magnet, and the signal connected therewith is unlocked. Each lever has two locks, one for the section each side of station.

The conductors D D', which should be well insulated, are connected to the sections of the track by tap-lines or connectors, and I so arrange these connectors that each section or

division of the track-rail is connected at both ends to the same conductor. Thus, for instance, the line conductor D is connected to the rail-section D² by the tap-lines $d\ d'$, while the rail D³ is connected to the conductor D' by the tap-lines $d^2\ d^3$, connected at opposite ends of the rail-section. So the rail-section D⁴ is connected to the conductor D by the tap-lines $d^4\ d^5$, and the rail-section D⁵ is connected to the conductor D at each end by the tap-lines or connectors $d^6\ d^7$. This arrangement is carried out throughout the system, so that it will be understood that the rails in the divisions 1, 2, and 3 are respectively connected to the conductors D and D' at each end of the sections. It will thus be seen that with the arrangement of batteries before described no current is passing through any of the conductors, as the batteries neutralize each other and the tap-lines are not connected and the signals remain in the position shown, being unlocked at B and the corresponding signal at A being locked.

Suppose a train approaching in the direction of the arrow 1. As soon as it reaches the rail-sections D²D³ the circuit of the conductor D D' is closed through the wheel and axle, and it will be seen that the current from the batteries H and H' at the station B passes through the conductor D', the tap-lines or connectors $d\ d^2$, the conductor D, through the coils of the magnet G' to the battery, and the magnet G' is energized. In like manner the current from the battery H H' at station A passes through the conductor D', the tap-line d^3 , the wheel and axle, the tap-line d' to the conductor D, and the magnet G is energized, the balance of the opposing batteries being thus broken and the whole line being energized. This results in drawing up both armatures F and F', and the result is that at station B the local circuit I' is broken, the magnet I being de-energized and the armature J allowed by spring or weight to operate to lock the signal against further disturbance, so that the operator cannot move the signal until the train has passed out of the signal-section and the local circuit becomes closed. At the station A the armature F being drawn up closes the local circuit K', energizes the local magnet K, and moves the armature-lever L to unlock the signal device, so that the operator can set the signal to "safety." If the next section is occupied by a train, the local circuit M' is open, causing the armature-lever N to be retracted to lock the signal against disturbance until the train has passed out of the section. It will thus be seen that as the train passes from division 1 to division 2, and so on throughout the section or block, the conductors D D' are energized all the time, and each division being connected at both ends with the conductors, if perchance one of the connectors or taps should be inoperative, the other would conduct the current, so as to maintain the main conductor D and D' charged, holding

the signals in the positions indicated until the train has passed out of the block.

It will be observed that if perchance the leading conductors D and D' should break down on any division the taps or connectors, being connected to the rails at each end of the division, will carry the current over the break through the rail-circuit and still maintain the signals in their locked and unlocked condition before set forth. When the train passes out of the block, of course the short circuit of the main circuit D D' is broken and the batteries become opposed to each other, so that no current passes and the magnets D D' are de-energized, allowing their armatures to assume the position indicated in the drawing, unlocking the signal at B and locking it at A. Of course it will be understood that this arrangement can be maintained throughout the line. A train entering a block from the opposite direction A will cause the same operation of circuits and signals, locking the lever or setting signal at B, so that a clear signal cannot be given to a train approaching from B, and thus preventing "head-on" collisions. This will of course apply as well to single-track railroads. It is obvious that this arrangement will operate an electric signal if placed in the local circuits I and K', so that a train will protect itself both ahead and in the rear. A switch W may be located in a section to be connected by taps W' and W² to the main circuit, so as to give the same result as if a train were on the section.

What I claim is—

1. In an electric railway-signal, an automatic device for locking and unlocking the signal, comprising an electric circuit including the magnets at each station, a locking device controlled thereby, and a battery at each station, the batteries being opposed to each other on the line, substantially as described.

2. In an electric railway-signal, an automatic device for locking and unlocking the signal-levers, comprising a closed electric circuit including a magnet at each end, a battery at each end, the batteries being opposed to each other on the line, local circuits controlled by said magnets, a locking device controlled by each local circuit, and tap-lines from the main circuit to the sections of the track, substantially as described.

3. In an electric railway-signal, an automatic device for locking and unlocking the signal-levers, comprising a closed electric circuit having opposed batteries and including a magnet at each end, the local circuits controlled by each magnet, a locking device controlled by each local circuit, and a track, the rails of which are divided in divisions, the rails of each division being connected to the main circuit by taps, substantially as described.

4. In an electric railway-signal, a closed main line having opposing batteries of equal strength, a magnet at each end of the line

controlling the signals, and a track divided in divisions, the rails of the track of each division being connected to the circuit by two tap-lines or connectors, one at each end of each division, substantially as described.

5 5. In an electric railway-signal, the combination of the charged main line having opposing batteries of equal strength, the track divided in divisions, and tap-lines connected to each end of each rail of the division and to the main line, substantially as described.

10 6. In an electric railway-signal, a main charged line including a magnet at each end, batteries located at each end of the circuit and opposed to each other, connectors from the main circuit to the rails of the track, and local circuits at each end of the line, controlled by the line and controlling the signals, substantially as described.

15 7. In an electric railway-signal, a closed electric circuit including a magnet at each end and having two batteries arranged in multiple at each station, the batteries of the

stations being opposed to each other of equal strength, and the rails of the track being in divisions, and connections from each track-division to the circuit, the arrangement being such that a train passing over the rails will short-circuit the main closed electric circuit, thus preventing signals passing over the line, substantially as described.

25 8. In an electric railway-signal, a closed electric circuit including a magnet at each end and having opposed batteries, tap-lines leading from the main line, and a switch included in the tap-lines, whereby the main line may be short-circuited by the switch, substantially as described.

30 In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH B. STEWART.

Witnesses:

F. L. FREEMAN,
ALLE N. DOBSON.