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W. E. FOSTER.

BLOCK SIGNALING APPARATUS.

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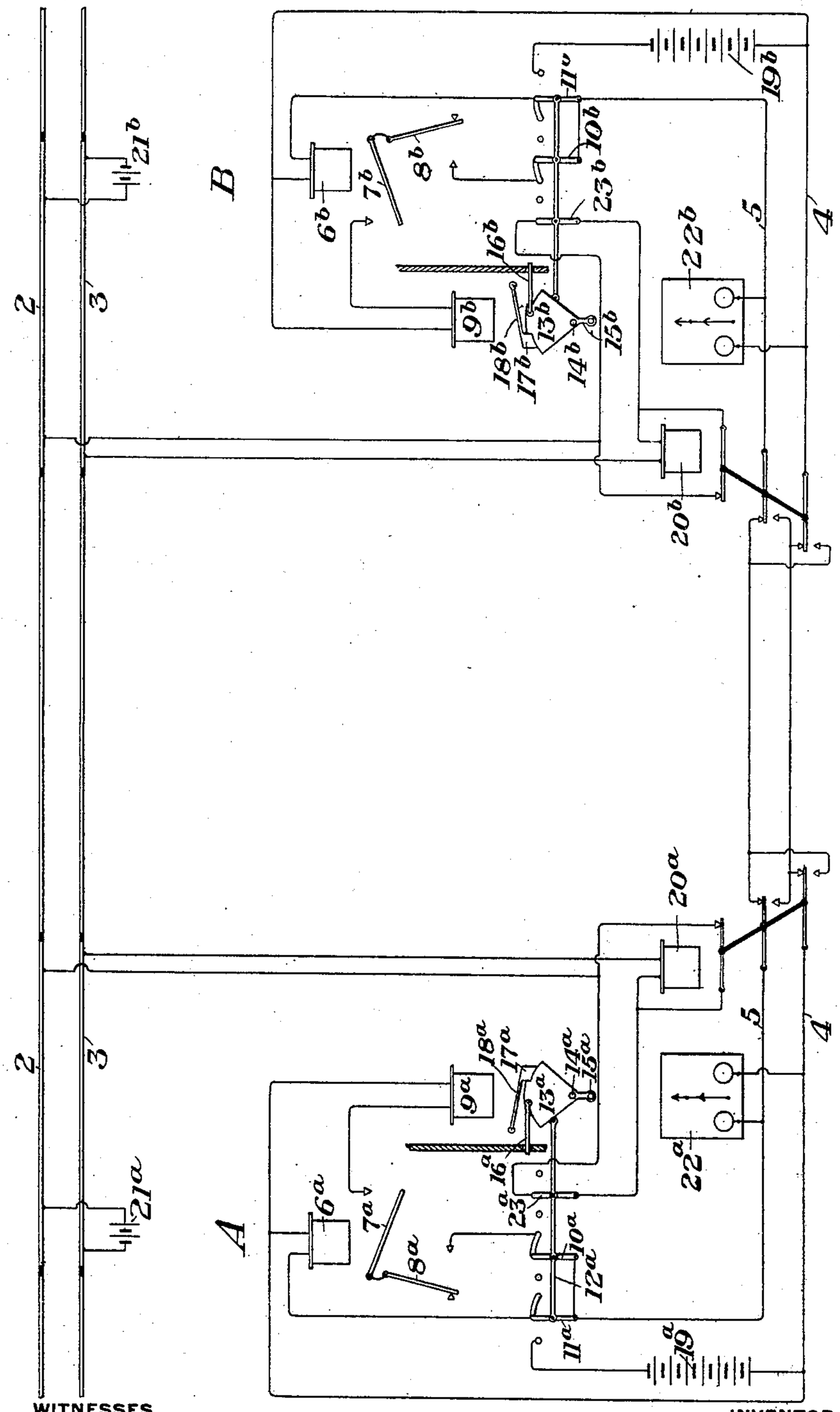

WITNESSES

R. A. Balderson

W. W. Swartz

INVENTOR

Walter E. Foster,

by Bakewell & Byrne,

his Attys

UNITED STATES PATENT OFFICE.

WALTER E. FOSTER, OF CHICAGO, ILLINOIS, ASSIGNOR TO UNION SWITCH & SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

BLOCK-SIGNALING APPARATUS.

No. 863,913. Specification of Letters Patent. Patented Aug. 20, 1907.

Application filed April 25, 1907. Serial No. 370,232.

To all whom it may concern:

Be it known that I, WALTER E. FOSTER, of Chicago, Cook county, Illinois, have invented a new and useful Block-Signaling Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, forming part of this specification, in which the figure is a diagrammatic view illustrating my invention.

My invention has relation to manually controlled block system apparatus for single or double tracks, and is designed to provide means of novel character for controlling the locking and unlocking of the signals.

The signals are normally locked in the stop position, requiring the coöperation of the signalmen at both ends of the block to clear one signal. The locks are controlled through a line circuit so arranged that a signal cannot be cleared unless the line polarity is right. The entrance of a train into the block automatically changes the polarity of the line circuit and holds the controller locked until the train passes out of the block and again automatically reverses the polarity.

The details of my invention will be best understood by reference to the diagram in the accompanying drawing, in which the numerals 2 and 3 designate the track rails which are arranged in insulated sections as shown.

A designates one tower or station, and B a second tower or station.

4 and 5 designate two line wires or conductors, which connect the two towers or stations. These wires at each station are carried through a polarized line relay.

The instruments and arrangement at the two stations are duplicates of each other, and the description will in general be confined to that at one station, corresponding numerals, however, being given corresponding parts at both stations with the distinguishing indices "a" and "b" respectively added thereto.

The relay 6^a at station A has a neutral armature 7^a and a polarized armature 8^a, said armatures being arranged to connect the coil of a lock magnet 9^a in parallel with the coil of the relay 6^a. The circuit of the coil 9^a is completed through the movable switch arms 10^a and 11^a. These switch arms are connected as by a rod 12^a with a controller segment 13^a, which is pivoted at 14^a, and whose handle portion 15^a normally stands in a central position, as shown, this being the normal locking position for the signal. This controller segment is connected with the signal locking mechanism, as indicated at 16^a, by any suitable mechanical connection. The segment is locked against movement in a direction to release the signal lock by means of a lock 17^a, which is carried or controlled by the armature 18^a of the lock magnet 9^a. A normally open battery 19^a or 19^b is arranged to be connected into the line circuit by means of the movable switch arm 10^a or 10^b.

20^a and 20^b designate two track relay magnets which are connected across short insulated sections of the track at each tower or station, and which are supplied by battery 21^a or 21^b, or other suitable source. At each station the line wires 4 and 5 are carried through the pole changing armatures of these track relays, as indicated, so that the polarity of the line will be reversed by each operation of the relays. At each station is a combined polarized indicator and call bell 22^a, or 22^b, which is connected across the conductors 4 and 5.

Both signals are normally locked in the stop position by the controllers 13^a and 13^b. Neither operator can throw his own battery on his own apparatus, but either one is at liberty to throw his battery onto the line wires 4 and 5 connecting the two stations. In doing this the operator actuates the polarized indicators at both stations.

To move a train from station A to station B, the operation is as follows:—Operator A moves the handle of his controller to the right, thereby throwing his battery 19^a into the line. This gives the proper bell signal to the operator at station B indicating to that operator that operator A wishes to be unlocked. Operator A then moves his controller back to the central position and waits for an unlock from operator B. When operator B receives the unlock signal, he throws his controller handle to the left, thereby throwing his battery onto the line. This operates the indicator at 22^a and picks up the line relay 6^a, which, in turn, closes the circuit of the lock magnets 9^a, thereby releasing the controller for operator A. The latter then moves his controller to the left and unlocks his signal. At this point he is at perfect liberty to put his signal back again and lock it. When the train accepts the signal and enters the block, it thereby shunts the track relay 20^a, which changes the polarity in the line, thereby opening the polarized armature 8^a and causing the lock 17^a to engage the controller segment 13^a to lock it in its reverse position. The train passes through the block, and while operator A is at liberty to put his signal back as soon as the train passes his station, he cannot put his controller back to its center position on account of the reverse polarity of the line. When the train passes out at station B, it shunts the track relay 20^b, thereby again reversing the polarity of the line and permitting the polarized armature 8^a of the line relay 6^a to close again. Each of the track relays 20^a and 20^b are what is known as "stick" relays, their circuits being completed through their own armatures, and being also carried through the movable contacts 23^a and 23^b of the switch device operated by the controller, as indicated, so that after these relays are once shunted, they cannot pick up again until their respective controllers are returned to their normal positions. After the train has passed out at the

station B, and the polarity of the line has been thus reversed as described, operator A can tell by his indicator that the train has passed out and he must then place his controller back to its normal position. In doing this, he closes the circuit of the track relay 20^a, which again picks up and reverses the polarity of the line. He then moves his controller handle to the right, throws his battery on the line, thereby operating the bell and indicator 22^b at station B, to announce the fact to the operator at that station. The indicator 22^b operates for this reason: The battery circuit being closed at both stations, and the polarity of the line being reversed through the track relay 20^b, (which is still open owing to the fact that operator B has not yet returned his controller to normal) both batteries are thrown on the indicator 22^b in opposition to each other, which actuates said indicator to restore its needle to normal position to give the required signal. After receiving this signal, operator B should then throw his controller back to its normal position and picks up the relay 20^b.

The particular embodiment of the invention illustrated is more especially designed for use with existing manual block signals as an auxiliary, for the purpose of normally locking the signal in the stop position. In operating the controller to give an unlock, it simply drives the plunger farther through the lock bar; and when operated in the opposite direction, after receiving the unlock, after the signal is cleared, it is impossible to put the controller back to its normal position without first putting the signal to its normal position. The arrangement may, however, be modified in many ways. Thus, in the case of electrically operated block signals, they may be controlled by carrying their circuits through the track relays, thus compelling the operator to put his signals back and lock it again before letting another train through. Substantially the same arrangement can be used for a continuous track circuit. Thus, if the first three sections constitute one block, having a continuous track circuit, and the relay 20^b is connected across the track at the entrance to the next block, the operation will be the same as that described.

Instead of using the polarized relays, a double-winding may be used on the lock magnets, the controlling coils of these magnets being arranged to act either in conjunction or in opposition according to the polarity of the line, as controlled by the track relays in the manner described; or the lock magnets may themselves be polarized.

Where a more flexible signaling system is required, a push button or equivalent device can be put in between the indicator and the track relay.

Various other modifications may be made by those skilled in the art without departing from the spirit and scope of my invention, since

What I claim is:—

1. In block signaling mechanism, a controller at each station, a lock therefor, means whereby said lock may be released from the next station, and means controlled by a passing train for reversing the line polarity and thereby controlling said lock; substantially as described.

2. In block signaling mechanism, a main circuit, a controller at each station, a lock therefor, and circuit connections whereby the operator at one station can release the lock at the next station, together with a track circuit controlled by the passage of trains and controlling the polarity of the main circuit to control said lock; substantially as desecribed.

3. In block signaling mechanism, a controller, a lock therefor, a polarized relay device for operating the said lock, a main circuit including said device, and a track circuit having means for effecting a reversal of the main line polarity to operate said relay device; substantially as described.

4. In block signaling mechanism, a main line including locking mechanism, and track circuits having pole changing relays through which the line circuit is carried, said operating mechanism being operated by the reversal of polarity in the main line; substantially as described.

5. In block signaling mechanism, a main line connecting the stations, locking mechanism at each station, and track circuits having pole changing relays through which the main circuit is carried, said relays being arranged to be short-circuited by passing trains to thereby operate the locking mechanism; substantially as described.

6. In block signaling mechanism, a controller, a lock therefor, an electro-magnetic device for controlling said lock, a main circuit for said device controlled from the next station, and a track circuit controlled by the passage of trains, and itself controlling the polarity of the main line; substantially as described.

7. In block signaling mechanism, a main circuit connecting two stations, a pole changing device at each end of the block and arranged to automatically reverse the polarity of the main circuit, and track circuits for controlling the pole changing devices; substantially as described.

8. In block signaling mechanism, a signal locking device, arranged to be operated by a reversal of the line polarity, and means whereby the passage of a train into and out of a block automatically reverses the line polarity and thereby operates said lock; substantially as described.

9. In block signaling mechanism, a main circuit connecting two signal stations, a normally open source of energy at each station for the said line, a controller at each station, a lock for each controller, circuit connections whereby the operator can connect the source of energy at his station with the main line to signal the next station and to release the lock at the next station, and track circuits having pole changing devices arranged to effect reversal of the polarity of the main circuit to thereby operate the locks; substantially as described.

10. In block signaling mechanism, a signal controller, a lock for normally locking said controller against movement in one direction, while permitting movement in the other direction, circuit connections and controlling devices whereby movement in the free direction will signal the next station, an electro-magnetic lock-releasing device, means for energizing said device from the next station, a track circuit having a magnet, and means controlled by said magnet for automatically reversing the polarity of the main circuit to thereby control the lock; substantially as described.

11. Block signaling mechanism comprising a main circuit connecting two stations, a normally open battery at each station, a lock controller having means for connecting the battery into the line, a signal mechanism at each station connected across the main circuit, a locking device at each station for the controller, and means for operating said lock which is operated by a reversal of polarity in the main circuit, and means controlled by the passage of trains into and out of the block for automatically reversing the polarity of the main circuit; substantially as described.

In testimony whereof, I have hereunto set my hand.

WALTER E. FOSTER.

Witnesses:

GEO. H. PARMELEE,

H. M. CORWIN.