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C. T. MOREY.

BLOCK SIGNALING SYSTEM FOR RAILWAYS.

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NO MODEL.

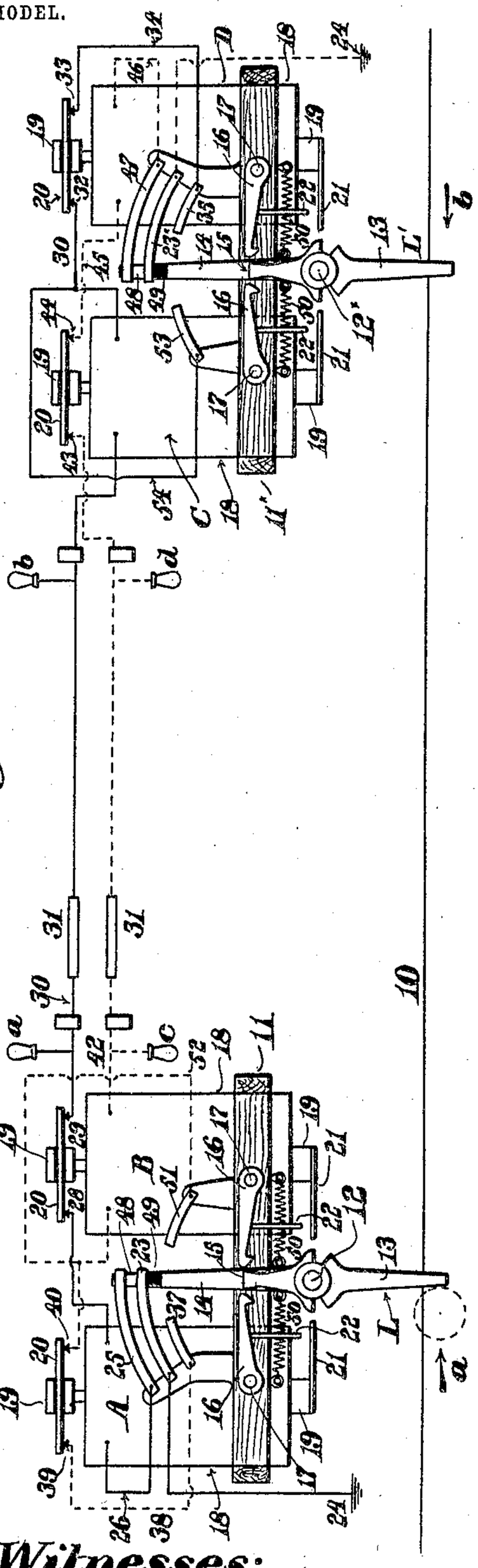

Fig. 1.

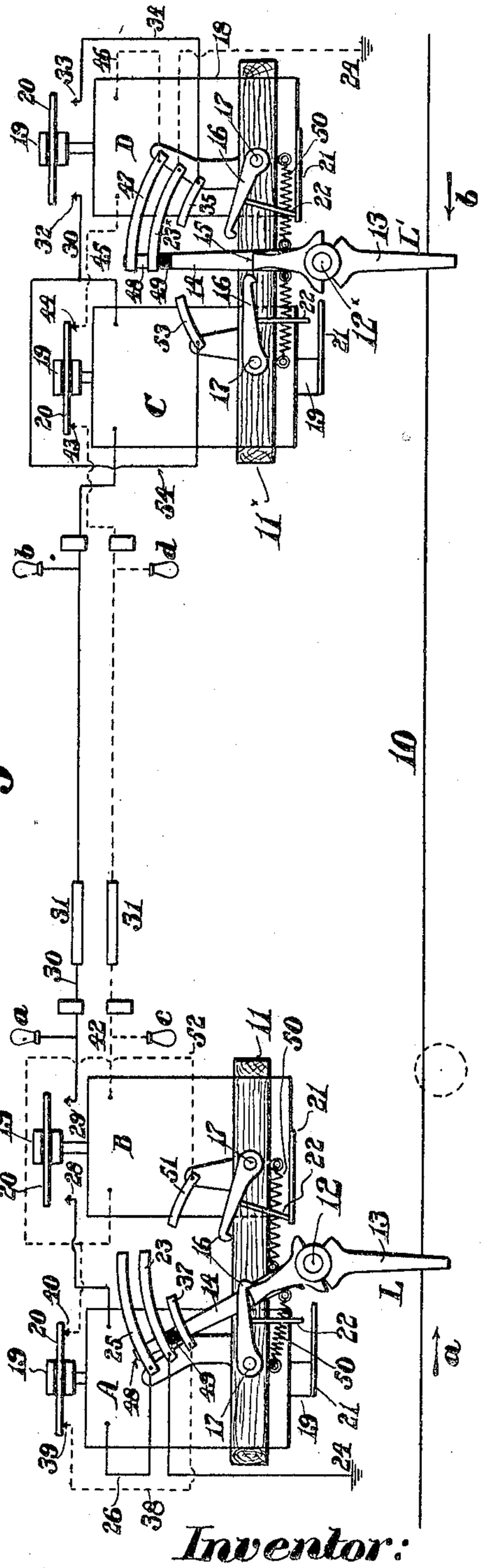

Fig. 2.

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UNITED STATES PATENT OFFICE.

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BLOCK-SIGNALING SYSTEM FOR RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 770,769, dated September 27, 1904.

Application filed May 12, 1904. Serial No. 207,518. (No model.)

To all whom it may concern:

Be it known that I, CHESTER T. MOREY, a citizen of the United States of America, and a resident of Cambridge, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Block-Signaling Systems for Railways, of which the following is a specification.

This invention relates to block-signaling systems for railways, and is more especially adapted for use upon electric railways having a single track, and is designed to guard the blocks between the various turnouts. It is adapted for use in systems in which a car entering at one end of the block sets two signals—one at the end where it enters and the other at the farther end, the former to notify the entering car that it has set the danger-signal at the other end and also to notify a following car that the block is occupied ahead of it by a car going in the same direction and the other to notify a car approaching the farther end that the block is occupied by a car coming toward that end.

This invention embodies a novel system of wiring and means for controlling the signaling-circuit whereby a car moving in one direction closes a circuit and causes the mechanism for closing to be retained in locked position, maintaining the circuit until the same car has operated upon the mechanism at the farther end of the block to break the circuit and energize the other circuit to cause the circuit-maintaining devices to be released and returned to their normal positions. It further provides for mechanism whereby a car in entering the block will cause the circuit to be closed and maintained in such closed position while the other circuit will simultaneously be broken, so that a car entering the opposite end of the block will not interfere with its working.

It consists in certain novel features of construction and arrangement of parts, which will be readily understood by reference to the description of the drawings and to the claims to be hereinafter given.

Of the drawings, Figure 1 represents a diagram of this improved signaling system, the various mechanisms being shown in their normal positions. Fig. 2 represents a similar view showing the parts in the positions which they assume when a car has entered the block from the left.

Similar characters designate like parts throughout both figures of the drawings.

In the drawings, 10 represents a trolley-wire above which, at either end of the block, is a frame 11, having pivoted thereto at 12 a two-part lever L. The part 13 of said lever L extends downwardly from its pivot 12 in the plane of the trolley, passing along the trolley-wire 10. The arm 14 of said lever L is provided with shoulders at 15, adapted to engage with pawls 16 on either side thereof, said pawls 16 being pivoted at 17 to the frame 11. Secured also to the frame 11 at either end of the block is a pair of solenoids A B, each composed of a coil 18 and a core 19, which is provided at its upper end with lateral contact members or circuit-breakers 20, while the lower end is provided with lateral extensions 21, adapted to engage with downwardly-extending fingers 22, secured to the pawls 16. The arms 21 are in the same plane with the downwardly-extending fingers 22 and are adapted to raise said pawls out of position to engage with the shoulders 15 when the core 19 of the solenoids is raised sufficiently. Each frame 11 has secured thereto a contact member 23 23*, wired to the ground 24. On one side of the ground-contact 23 (at the left of Fig. 1) is a contact 25, from which a wire 26 leads to the coil of the solenoid A, from which a wire 27 leads to a contact 28, from which a current may pass through the laterally-projecting arms 20 of the core 19 of the solenoid B. The opposite arm 20 of the core 19 of solenoid B engages with a contact 29, from which leads a wire 30 to a danger-signal device *a*, thence through the resistance 31 to the safety-signal device *b*, thence through the coil of solenoid C, and then to the contact 32, engaging with the laterally-projecting arms 20 of the core 19 of solenoid D, the opposite arm of which engages with contact 33, from which a wire 34 leads to a contact member 35. On the other side of the ground-contact 23 is a contact member 37, connected by a wire 38 to the contact 39, engaging with an arm 20 of the core 19 of solenoid A, the other arm 20 of which engages with a contact 40, connected by a wire

41 to the coil of solenoid B. A wire 42 leads from said coil to a safety-lamp *c*, through a resistance-coil 31, to a danger-lamp *d* at the other end of the block, said wire leading to a contact 43, engaged by an arm 20 of the core 19 of solenoid C, the opposite arm 20 of which engages with a contact 44, connected by a wire 45 with the coil of solenoid D, which in turn is connected by a wire 46 to a contact member 47, normally connected to the ground-contact member 23* by the outer end 48 of the arm 14 of the lever L′, pivoted at 12* to the framework 11* at the right of the drawings. The outer end 48 of each lever L L′ is insulated at 49 from the main portion of said levers. Each lever L L′ is normally held in central position between the solenoids A and B and C and D, respectively, by means of springs or other tension devices 50. Opposite the contact member 37 is a similar contact member 51, connected by a wire 52 to the wire 41. Similarly situated opposite the contact member 35 is a contact member 53, connected by a wire 54 to the wire 30 at a point between the coil of solenoid C and the contact 32.

In the operation of the device if a car enters the left end of the block, as indicated by arrow *a*, and a trolley thereof passes along the wire 10 and comes into contact with the arm 13 of the pivoted lever L at the left of Figs. 1 and 2 it will move the lever L against the tension of the springs 50 into position to contact with the member 37, completing the circuit, thereby permitting a current to pass from the trolley-wire through the lever L to the member 37, thence through the wire 38, contact 39, arms 20 of the core of solenoid A, contact 40, wire 41 to the coil of solenoid B, wire 42, lighting the safety-lamp *c* and danger-lamp *d*, thence to contact 43, the arms 20 of solenoid C, through contact 44, wire 45 and the coil of solenoid D, wire 46 to member 47 to the end 48 of the lever L′ at the right of the figures, thence through the ground-contact member 23* to the ground, where the circuit is completed. This passage of a current through this circuit and through the coils of solenoids B and D will cause the core thereof to be raised, thereby breaking the contact between the arms 20 of said solenoids and the contacts 28, 29, 32, and 33. This will prevent the lever L′ at the right of the figure from being operated upon by any car coming in the opposite direction, as indicated by arrow *b*, the trolley simply engaging the arm 13, moving the arm 14 into contact with the member 35; but the contact being broken by the raising of the cores 19 of solenoids B and D as soon as the trolley passes the lever said lever will be returned to its normal position by the action of the springs 50. When the trolley of a car entering the block operates upon the lever L and moves it into the position as indicated at the left of Fig. 2, it will raise the pawl 16 and pass beneath it into position to be locked thereby and be retained in such locked position until the car passes the length of the block and operates upon the second lever L′ at the farther end of the block, when that lever will be moved out of contact with the members 47 48 (breaking that circuit and permitting the core 19 of solenoid B to drop to complete the other circuit) and into contact with the contact member 53, raising its pawl 16, and will be engaged thereby to hold it in position until a sufficient current has been passed from the trolley-wire through the lever L′ to the contact member 53 and thence through the coil of solenoid C. The current will then pass from the coil of solenoid C through the wires 30, contacts 29, arms 20, contact 28, wire 27, and through the coil of solenoid A, raising the core thereof and lifting the pawl 16 to release it from engagement with the shoulder 15 of the arm 14 of the lever L, and thereby freeing it from engagement and permitting the springs 50 to act thereon to return it to its normal position. At the same time the current passing through solenoid C will lift its core to release its pawl 16 and permit the return of the lever L′ to its normal position. By the use of this system after a car had come into said block from the left of the figures a car entering the block by accident from the opposite direction would not interfere with the signals, and the conductor noting the fact that the danger-signal was displayed would proceed to stop the car and move it off the block. If after a car had entered the block a cross-wire should connect the two wires 30 42, no interference with the signals would be produced thereby, as the core of solenoid B being raised the current could not pass from 42 through 30 and through the arms 20 of solenoid B, while if the current should pass in the opposite direction it would be stopped by the separation of the arms 20 of solenoid D and its contacts 32 and 33. Should the cross-wiring occur before a car had entered the block while the cores of the solenoids were in their normal positions, no signals would be displayed, and the motorman would immediately become aware of the fact that the system was out of order and proceed with caution. At no time would signals be displayed that would deceive.

This makes a simple and effective block-signaling system which dispenses entirely with the necessity of the conductor leaving the car to change the signals, all the operation of lighting and putting out the signals being performed automatically by the moving car. It prevents a car entering at one end of the block from disarranging the signals operated by a car which has already entered the opposite end, and thereby affords an opportunity for the conductor to discover the danger-signals displayed even after the

car has entered the block. After a car has entered one end of the block and operated the signals it prevents a car entering the opposite end from displaying any signals or otherwise disarranging the system.

It is believed that with this description the operation of the invention will be thoroughly understood.

Having thus described my invention, I claim—

1. In a block-signaling system, the combination of a normally broken circuit containing signals at each end of the block, mechanism at one end of the block for closing the circuit, mechanism at the other end of the block for opening said circuit, and means for maintaining the circuit between the operations of the two mechanisms.

2. In a block-signaling system, the combination of a normally broken circuit containing signals at each end of the block, a pivoted lever at one end of the block for closing the circuit, a second lever at the other end of the block for opening the circuit, and means for maintaining the circuit between the operations of the two levers.

3. In a block-signaling system, the combination of a normally broken circuit containing signals at each end of the block, a trolley-operated pivoted lever at one end of the block for closing the circuit, a second lever at the other end of the block for opening the circuit, and means for maintaining the circuit between the operations of the two levers.

4. In a block-signaling system, the combination of a normally broken circuit containing signals at each end of the block, a pivoted lever at one end of the block for closing the circuit, a second lever at the other end of the block for opening the circuit, means for maintaining the circuit between the operations of the two levers, and means for preventing the effective operation of the second pivoted lever in the opposite direction until first operated to open the circuit.

5. In a block-signaling system, the combination of a circuit containing signals at each end of the block, a pair of solenoids at either end of the block and in said circuit, a pivoted lever interposed between each pair of solenoids and normally out of circuit, means for operating one of said levers to close the circuit, means for retaining said lever in closing position, and means for operating the second lever for releasing the first lever.

6. In a block-signaling system, the combination of a circuit containing signals at each end of the block, a pair of solenoids at either end of the block and in said circuit, a pivoted lever interposed between each pair of solenoids and normally out of circuit, means for operating one of said levers to close the circuit, pawls for retaining said lever in closing position, and means operated by the second lever for releasing the first lever.

7. In a block-signaling system, the combination of a circuit containing signals at each end of the block, a pair of solenoids at either end of the block and in said circuit, a pivoted lever interposed between each pair of solenoids and normally out of circuit, means for operating one of said levers to close the circuit, pawls for retaining said lever in closing position, means for centering said lever and holding it normally out of circuit, and means operated by the second lever for releasing the first lever.

8. In a block-signaling system, the combination of a circuit containing signals at each end of the block, a pair of solenoids at each end of the circuit, contact members secured to the core of each solenoid, means for transmitting a current through a coil to lift the core, a pivoted lever coöperating with each pair of solenoids to make and break the circuit, a pawl for engaging said lever and holding it out of the normal position, and means secured to said core for operating said pawl to prevent engagement with said lever.

9. In a block-signaling system, the combination of two normally broken circuits containing signals at each end of the block, a pair of solenoids at either end of the block the coil of one and a member secured to the core of the other being contained in each circuit, means at one end of the block for transmitting a current from a main supply to either circuit, and means at the opposite end of the block for breaking the circuit.

10. In a block-signaling system, the combination of two normally broken circuits containing signals at each end of the block, a pair of solenoids at either end of the block the coil of one and a member secured to the core of the other being contained in each circuit, means at one end of the block for transmitting a current from a main supply to either circuit, means at the same end of the block for maintaining the circuit until released, and means at the farther end of the block for releasing said maintaining mechanism.

11. In a block-signaling system, the combination of two normally broken circuits containing signals at each end of the block, a pair of solenoids at either end of the block the coil of one and a member secured to the core of the other being contained in each circuit, means at one end of the block for transmitting a current from a main supply to either circuit, and means actuated by the device for closing one circuit for preventing the operation of the other circuit.

12. In a block-signaling system, the combination of two normally broken circuits containing signals at each end of the block, a pair of solenoids at either end of the block the coil of one and a member secured to the core of the other being contained in each circuit, a pivoted lever with each pair of solenoids connecting with the main supply, means for op-

erating one of said levers to close a circuit, mechanism for retaining said lever in position to maintain the circuit, and mechanism operated by the other lever for releasing the first lever and breaking the circuit.

13. In a block-signaling system, the combination of two normally broken circuits containing signals at each end of the block, a pair of solenoids at either end of the block the coil of one and a member secured to the core of the other being contained in each circuit, a pivoted lever with each pair of solenoids connecting with the main supply, means for operating one of said levers to close a circuit, mechanism for retaining said lever in position to maintain the circuit, mechanism operated by the other lever for releasing the first lever and breaking the circuit, and mechanism actuated by the closing of one circuit for opening the other circuit.

14. In a block-signaling system, the combination of two normally broken circuits containing signals at each end of the block, a pair of solenoids at either end of the block the coil of one and a member secured to the core of the other being contained in each circuit, contacts in each circuit adapted to engage with said core member, and means at one end of the block for transmitting a current from a main supply to one circuit and thereby operate the core members on the other circuit to break the current.

15. In a block-signaling system, the combination of two normally broken circuits containing signals at each end of the block, a pair of solenoids at either end of the block the coil of one and a member secured to the core of the other being contained in each circuit, contacts in each circuit adapted to engage with said core member, means at one end of the block for transmitting a current from a main supply to one circuit and thereby operate the core members on the other circuit to break the current, a circuit-breaking mechanism for the operating-circuit at the opposite end of the block, and means for maintaining the energy of the operating-circuit until the operation of said circuit-breaking mechanism.

16. In a block-signaling system, the combination of two normally broken circuits containing signals at each end of the block, means for closing one of the circuits, a pair of solenoids at either end of the block, means secured to the core of one solenoid of each pair for breaking one circuit, and means secured to the core of the other solenoid of each pair for breaking the other circuit.

17. In a block-signaling system, the combination of two normally broken circuits containing signals at each end of the block, a solenoid in one of the circuits, and means secured to the core of said solenoid for breaking the other circuit.

18. In a block-signaling system, the combination of two normally broken circuits containing signals at each end of the block, a solenoid in one circuit, a pivoted lever for one of said circuits, a pawl for locking said lever in closing position, and means secured to the core of said solenoid for releasing said locking mechanism.

19. In a block-signaling system, the combination of two circuits normally broken containing signals at each end of the block, a pair of solenoids at either end of the block, a pivoted lever at one end of the block for closing one of the circuits, a locking device for holding said lever in closing position, means operated by the closing of one circuit for actuating the core of a solenoid of each pair for breaking the other circuit, and a pivoted lever at the farther end of the block for actuating the core of the other solenoid of each pair for releasing said locking mechanism.

20. In a block-signaling system, the combination of two circuits normally broken containing signals at each end of the block, a pair of solenoids at either end of the block, a pivoted lever at one end of the block for closing one of the circuits, pawls for engaging said lever, and mechanism secured to the core of a solenoid for lifting said pawls.

21. In a block-signaling system, the combination of two circuits normally broken containing signals at each end of the block, a pair of solenoids at either end of the block, a pivoted lever at each end of the block for closing one of the circuits, pawls for engaging said levers, and mechanism at the opposite end of the block for lifting the cores of one of the solenoids of each pair to actuate said pawls and release the pivoted levers.

22. In a block-signaling system, the combination of a normally broken circuit containing signals at each end of the block, a trolley-operated pivoted lever at one end of the block for closing the circuit, a second lever at the other end of the block for opening the circuit, and means for locking the various devices to maintain the circuit between the operations of the two levers.

23. In a block-signaling system, the combination of a normally broken circuit containing signals at each end of the block, a pivoted lever at one end of the block for closing the circuit by a movement in one direction, a second lever at the other end of the block for opening the circuit by a movement in the same direction, means for maintaining the circuit between the operations of the two levers, and means nullifying the operation of said levers in the opposite direction.

Signed by me at Boston, Massachusetts, this 10th day of May, 1904.

CHESTER T. MOREY.

Witnesses:
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EDNA C. CLEVELAND.