No. 853,403. PATENTED MAY 14, 1907.

W. R. FULLER.

ELECTRIC BLOCK SYSTEM FOR RAILWAYS.

APPLICATION FILED JAN. 19, 1907.

2 SHEETS—SHEET 1.

Fig. 1.

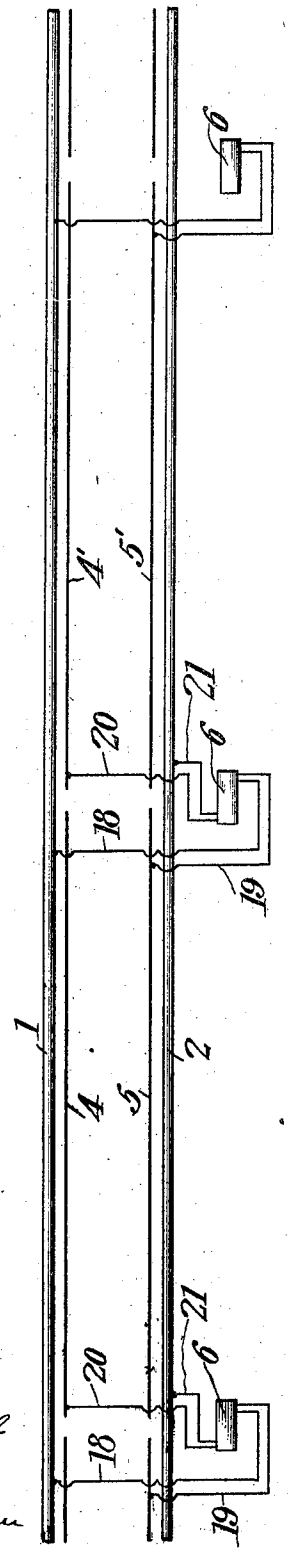
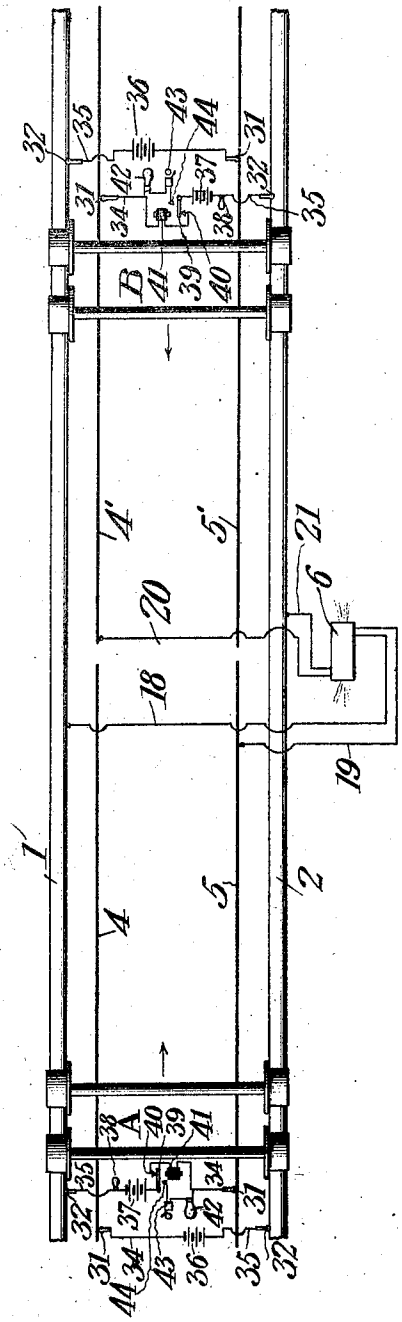


Fig. 2.



WITNESSES:

E. G. Stewart

F. J. Chapman

Walter R. Fuller INVENTOR

By C. A. Snow & Co.

ATTORNEYS.

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Fig. 5.

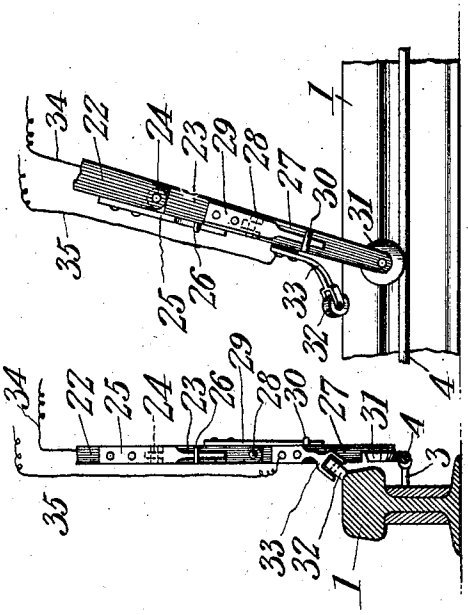


Fig. 4.

Fig. 3.

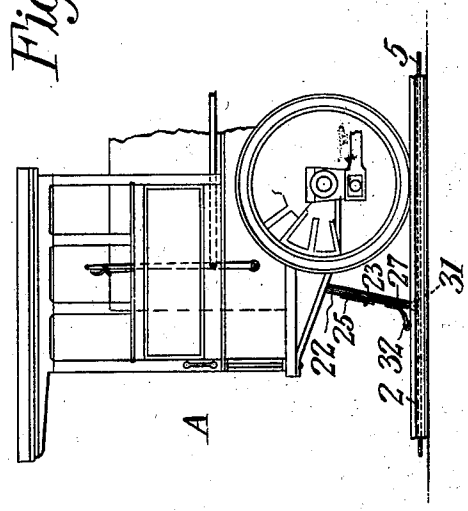
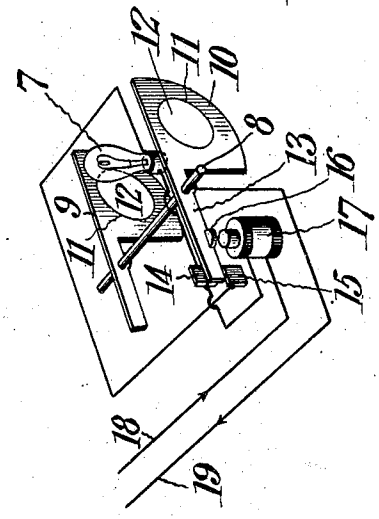


Fig. 6.



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UNITED STATES PATENT OFFICE.

WALTER R. FULLER, OF ATLANTA, GEORGIA.

ELECTRIC BLOCK SYSTEM FOR RAILWAYS.

No. 853,403. Specification of Letters Patent. Patented May 14, 1907.

Application filed January 19, 1907. Serial No. 353,125.

To all whom it may concern:

Be it known that I, WALTER R. FULLER, a citizen of the United States, residing at Atlanta, in the county of Fulton and State of Georgia, have invented a new and useful Electric Block System for Railways, of which the following is a specification.

This invention has reference to improvements in electric block systems for railways, and its object is to provide a means whereby the passage of a train upon a block will cause the display of a danger signal at the intersection of the said block and the next succeeding block, and also the display of the danger signal at the next preceding block, while both signals appear at "safety" to the engineer of the train occupying the said block.

The invention has also for an object means whereby the engineer is apprised of the operativeness of the danger signal by the visibility of his safety signal.

With these and other objects in view, the invention consists essentially in dividing the track-conductors into conducting sections in length equal to the proposed block and providing conductors along the track coupled at the junction of the blocks to signal operating devices of the visible type, and providing each train, preferably the locomotive, with a source of current by means of which the signal operating devices arranged upon the track at the intersection of the blocks may be actuated.

The invention will be more fully understood from the following detailed description taken in connection with the accompanying drawings forming part of this specification, wherein,—

Figure 1 is a diagrammatic representation of a track including two blocks and the contiguous ends of two more; Fig. 2 is a diagrammatic representation of the contiguous ends of two blocks with trains in each block approaching each other; Fig. 3 is a view of an engine cab and rail showing a trolley arm depending from said cab; Fig. 4 is a cross section of a rail with the trolley in operative relation thereto and with the conductor located adjacent to the rail; Fig. 5 is a side elevation of the structure shown in Fig. 4; and Fig. 6 is a perspective view of one of the signal devices located along the traffic rails at the intersection of two blocks.

Referring to the drawings, there is shown a line of track consisting of traffic rails 1—2 of usual construction and so laid as to be conducting to electric currents throughout. Parallel to each of these rails and preferably supported by insulating or insulated brackets 3 fast to the web portion of the rail on the inner face thereof is a conductor 4 or 5, respectively. These conductors are of a length corresponding to the length of a block, there being two parallel conductors 4—5, one carried by one rail of the track and the other carried by the other rail of the track, in each block.

Located at the contiguous ends of the blocks are signaling devices 6 indicated in Figs. 1 and 2 by simple rectangles designated by the numeral 6, and which may be taken to represent the protecting casing in which these signaling devices are housed.

Within each casing 6 is supported an electric incandescent lamp 7 of clear glass, that is, one that will show a clear or white light. Mounted upon a common pivot rod 8, or separately mounted if desired, are targets 9—10 each of which contains an aperture 11 closed by a transparent red pane 12 which may be of any transparent colored material such as a plane mica or glass sheet or a glass bull's-eye, or lens appropriately colored red, or used in conjunction with a red screen of transparent material. The targets 9—10 are so pivoted as to be movable into and out of operative relation with the lamp 7, which latter, it will be understood, will be arranged in line with apertures in the casing 6 through which apertures the light may be seen by an engineer on an engine approaching the signal device or receding therefrom. On the side of the pivot support 8 remote from the target there is a switch arm 13 which may, if desired, be an integral part of the target. The switch arm 13 is movable over two contact plates 14—15 arranged close enough together to be bridged by said arm so that there is no break in the circuit when the arm passes from one contact plate to the other. The switch arm carries an armature 16 in operative relation to an electro-magnet 17. A conductor 18 coming from one of the traffic rails, say the traffic rail 1, is connected to one terminal of the magnet 17 and the other terminal of this magnet is connected to the contact plate 14, which latter is also connected to one terminal of the lamp 7, as indicated in Fig. 6. The

other terminal of the lamp 7 is connected to the contact plate 15, and the switch arm 13 is connected by conductor 19 to a conductor 5 along side of traffic rail 2.

It will be seen that when the conductors 18—19 constitute part of a charged circuit and the switch arm 13 is upon the contact plate 14, being normally held in this position by the weight of the target, which overbalances it, the circuit may be traced from the conductor 18 through the magnet 17 to the contact plate 14 through the switch arm 13 and returning through the conductor 19, thus energizing the magnet. The armature 16 is attracted and moves the switch arm 13 into contact with the contact plate 15 at the same time raising the red eye of the target in front of the lamp 7. The circuit will now be from conductor 18, through the magnet 17, thence to contact plate 14, and to the lamp 7, returning by way of the contact plate 15 and switch arm 13 to the other conductor 19. During this movement the magnet has remained energized because the two plates 14 and 15 were bridged by the switch arm 13.

Under the conditions just described the target 10 has been moved to cause the display of a red light on that side of the lamp 7, while the target 9 has remained inactive and therefore the light as viewed from the side of the lamp corresponding to the target 9 will appear as clear or white.

The magnet 17 controlling the target 9 is included in the conductor 20 coming from the block conductor 4′ of the next adjacent block and the conductor 21 connected to the rail 2.

At each junction of two blocks a signal operating device 6, such as has been described and which is best shown in Fig. 6, is used and three such signal operating devices are shown in Fig. 1.

Upon each locomotive or other desirable part of the train is a depending trolley arm 22 having near its lower end a section 23 connected to the trolley arm 22 by a one-way hinge 24, being held in position normally in line with the trolley arm 22 by a flat spring 25 fast on said arm 22 and bearing against, with its free end, the section 23, an eye 26 upon the section 23 and encircling the free end of the spring being provided to limit the movement of this section 23. Hinged to the lower end of the section 23 is still another section 27 connected to the said section 23 by a one-way hinge 28 permitting movement of the section 27 relative to the section 23 in a plane at right angles to the plane of movement of the section 23 relative to the trolley arm 22. A spring 29, similar to the spring 25, is fast on the section 23 and engages the section 27, passing through an eye 30 thereon.

On the lower end of the section 27 is mounted a trolley wheel 31 arranged to bear upon and travel along the conductor 4 or 5, and the section 27 also carries another trolley wheel 32 upon one end of a bracket 33, which bracket is appropriately bent to permit the trolley wheel or roller 32 to make contact with the tread of the rail 1 or 2.

Each locomotive will carry two of these trolley arms, one for contact with the rail 1 and conductor 4, and the other for contact with the rail 2 and conductor 5, but the trolley wheel 31 of one trolley arm 22 will be in circuit through a conductor 34 with the roller 32 of the other trolley arm, to which the conductor 35 is connected.

Referring now to Fig. 2, two locomotives A—B are indicated traveling toward each other, as shown by the arrows, toward the meeting ends of two blocks. Upon each locomotive there is a battery or other suitable source of electric energy 36 included in circuit between one of the trolley wheels 31 of one trolley arm 22 and the roller 32 of the other trolley arm 22. In the circuit on the locomotive between the other trolley wheel 31 and roller 32 there is included a battery 37 and lamp 38 in series, together with the switch arm 39 normally including in the circuit through a contact 40 a magnet 41. In multiple with the branch containing the magnet 41 is another branch containing a lamp 42 and a bell 43 or other similar signal device. This branch terminates at a contact plate 44 in the path of, but normally out of contact with, the switch arm 39, which latter is arranged to constitute the armature of the magnet 41. Now, let the locomotive A only be considered. It will be observed that a circuit will be established from the battery 37 through the lamp 38 to the rail 1, thence by conductor 18 to the magnet 17 controlling the target 10 facing the next succeeding block, thence returning by conductor 19 to track conductor 5 and through the magnet 41, contact 40, and switch arm 39 to the battery. Assuming that the train has just entered upon the block, it will be seen that the next succeeding switch mechanism 6 has been operated to display the red light toward the next succeeding block, which light would be visible to the engineman on a train approaching that block upon which the engine A is now traveling, and he would thereby be warned that he was approaching an occupied block. At the same time, there is established a circuit from battery 36 to conductor 4, back to branch conductor 20 at the end of the block back of the traveling engine to the magnet 17 controlling the target 9, and returning by branch conductor 21 to the traffic rail 2 and thence to battery 36. This displays a red light to any engineman approaching on a train which has entered upon the preceding block just left by engine A, but these signal lights at both ends of the block appear white or clear to the engineman of engine A. Also, the lamp 38, which may be white or

clear or may be blue or green, if desired, will glow steadily within sight of the engineman of engine A, this light being located in the cab. The magnet 41 is so adjusted that under the voltage of the current source 37 it will be too weak to attract the armature 39, and the branch circuit through the lamp 42 and bell 43 will therefore remain out of circuit. Suppose, now, that while engine A is upon the block engine B, coming from the other direction, should enter the block, and there should therefore be danger of a head-on collision. Under these circumstances, battery 37 on engine A and battery 36 on engine B would be coupled up in series as would also the battery 37 on engine B and the battery 36 on engine A. In each circuit there would then be generated sufficient voltage to energize the magnets 41 to an extent that would cause them to attract their armatures 39 to make contact with the contacts 44 and thus include the lamps 42 and alarms 43 in circuit. The lamps 42 may be red lamps and, together with the alarms 43, notify both visually and audibly both engineers of extreme danger. Provision may be made for locking the armature switch arms 39 in the attracted position and at the same time cutting out the magnets 41 when the emergency signal on the engine has been put in circuit, or a similar structure to that shown in Fig. 6, wherein the magnet circuit is not broken, may be employed. Now, let it be supposed that train A is upon the block and another train should approach it from the rear. Then the battery 37 of the approaching train will be in opposition to the battery 36 of train A and the result will be a dead loop through which no current will flow, and lamp 38 of the approaching train will cease to glow, thus notifying the engineman of the approaching train that he has run into a danger zone.

It will be seen that at each signal device 6 the lamp 7 will not glow until the target in front of it has been moved into a position to show danger, and the fact that the engineman of the approaching train is enabled to see the light at all, that is, the white light, is an assurance to him that the red signal has been set for the next succeeding block, and the same thing is true for the signal to the rear of him whereby a red signal has been displayed at the junction of the preceding block with the block upon which the train is now supposed to be.

It will thus be seen that by this invention there is provided a block system entirely automatic in character, showing protecting signals both to the block ahead and to the block in the rear of the occupied block.

It will also be observed that the trolley arm structure described with reference to Figs. 4 and 5 provides a flexible contact which will tend at all times to maintain good contact despite irregularities of the conductors or rails.

I claim:—

1. In a block system for railways, sectional conductors extending throughout the length of a block, a source of current upon each train for energizing said conductors, and signal indicating devices at the junction of the blocks in circuit with said conductors and indicating danger to the next block and safety to the occupied block.

2. In a block system for railways, sectional line conductors arranged along said railway and continuous for the length of a block and constituting, together with the traffic rails two normally open circuits, each independently charged, and two independent sources of current upon each locomotive for the said circuits, and a signal indicating device at the intersection of the blocks independently coupled to each circuit, and operating to display a danger signal to the blocks immediately succeeding and immediately preceding, and to display a safety signal to the occupied block at each end.

3. In a block system for railways, a signal device comprising a visual signal located at the junction of blocks, targets in the line of vision, electro-magnets operating said targets, a line of conductors extending along the railway and connected to one of the signal operating magnets at one end of the block, another line of conductors extending along the railway and connected to the correspondingly other signal operating magnet at the other end of the block, and independent sources of current carried upon the trains and charging said conductors.

4. In a block system for railways, a signal device comprising an electric lamp, pivoted targets carrying red screens and arranged on each side of the lamp in the line of vision, extensions of said targets constituting switch arms, magnets in operative relation to armatures therefor carried by said switch arms, and contacts in the path of said switch arms and connected to said magnets and lamp and to an external circuit, and arranged to light the lamp only when one of the targets is moved into the line of vision.

5. In a block system for railways, a system of block circuits, other circuits coacting therewith and carried upon the trains and including a source of current, and electrically actuated signal devices at the junction of the blocks including a magnet in the block circuit, a switch-arm carrying a normally inactive signal device and included in the magnet circuit, and a normally open circuit branched from the magnet circuit and having a terminal in the path of the switch-arm.

6. In a block system for railways, a system of block circuits, other circuits coacting therewith and carried upon the trains and

including a source of current, and electrically actuated signal devices at the junction of the blocks including a magnet in the block circuit, a switch-arm carrying a signal device and biased to hold said device normally inactive, said switch-arm being included in the magnet circuit, and a normally open circuit branched from the magnet circuit and having a terminal in the path of the switch-arm.

7. In a block system for railways, electric circuits for each block, signal indicating devices at the junctions of the blocks, and independent sources of current upon each train arranged to coact when trains approach to increase the current in the circuit including the trains and to neutralize the current in the circuit including two trains moving in the same direction upon the same block.

8. In a block system for railways, the combination with a conducting traffic rail and a conductor carried thereby but insulated therefrom, of a trolley arm or collector comprising two hinged sections in alinement one with the other and movable in planes at right angles to each other, springs holding these sections normally in alinement but yieldable to permit movement of the sections in their individual planes, and collectors carried by one of the sections and insulated from each other.

9. In a block system for railways, a trolley arm or collector having two hinged sections in alinement one with the other and movable in planes at right angles to each other, springs holding these sections normally in alinement but yielding to permit movement of the sections in their individual planes, and means carried by one of the sections for collecting current.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses:

WALTER R. FULLER.

Witnesses:
E. HUME TALBERT,
GEO. M. NAPIER.