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J. A. DUFFY & O. IRWIN.

SWITCHING DEVICE.

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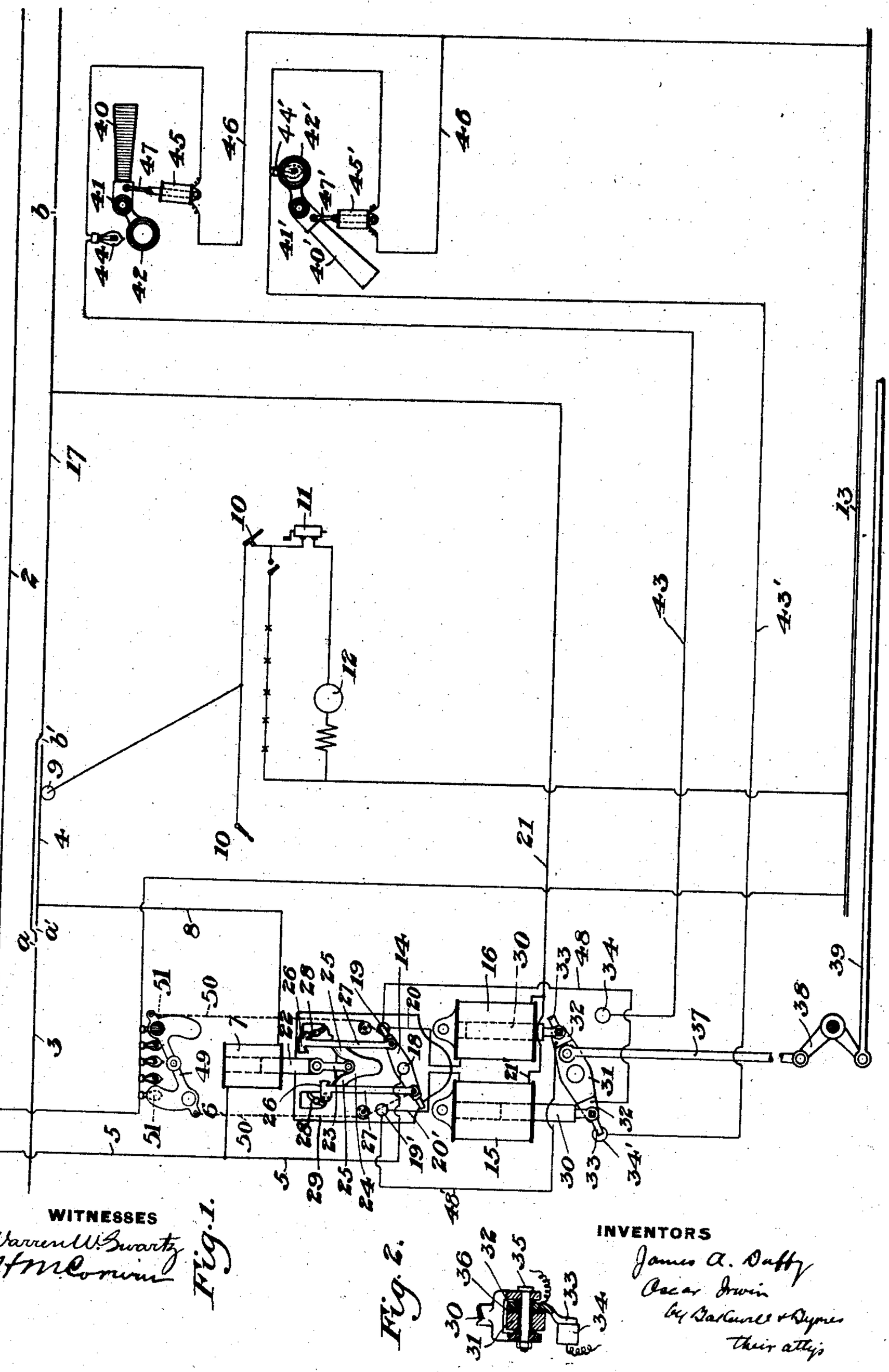

Fig. 1.

Fig. 2.

WITNESSES

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SWITCHING DEVICE.

No. 883,701. Specification of Letters Patent. Patented April 7, 1908.

Application filed January 19, 1904. Serial No. 189,672.

To all whom it may concern:

Be it known that we, JAMES A. DUFFY and OSCAR IRWIN, of the city of Pittsburg, Allegheny county, Pennsylvania, have invented a new and useful Switching Device, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a diagrammatic view showing the wiring system and mechanical connections of our improved switching device and Fig. 2 is a detail view showing a portion of the insulation.

Our invention relates to the switch mechanism of railroads especially street cars, but it may be adapted to steam railroads or any tracks containing switches.

The object of the invention is to provide electrical mechanism by which the operator on the car may throw the switch or leave it in its position; and further to automatically lock the switch after it is thrown and until after the car has passed it.

It is further designed to provide signal mechanism which will indicate the position of the switch and indicate to the operator whether or not he wishes to shift it.

It is also designed to supply current to the car motor during the time that the switch is being shifted, and also during the time that the switch is held in locked position until after the car has passed it.

It is further designed to arrange the signal mechanism in such a manner that accidental shifting of the switch will shift the signals so that they will always indicate its position.

In the drawings 2 is the general feed wire and 3 the trolley wire having a dead section 4 extending from a' to b' and which is fed through wire 5 leading down and having a branch 6 which leads through the solenoid 7 and back through wire 8 to the section 4.

When the car trolley 9 bears on the dead section and the car controller is in the on position, the current flows from the dead section down through the trolley, through the head switch 10, through the controller 11 and then through the motor 12 and to the rail 13, completing the circuit. In this case the magnet 7 is energized and pulls up the shifting device which throws the two-point switch 14 and thus shifts the current from one to the other of the electro-magnets 15 and 16 when the trolley wheel 9 passes on to the section 17 of the trolley wire. The current through these magnets actuates the switch. It will here be explained that so long as the trolley is on the section 4, the magnet 7 is energized, but there is no current passing through either of the magnets 15 and 16. When the trolley leaves the section 4 and engages the section 17, then the magnet 7 is deënergized, and one or the other of the magnets 15 and 16 is energized. When the magnet 16 is energized, the circuit is as follows: wire 5, post 18, switch member 14, contact 19, wire 20, magnet 16, wire 21, trolley section 17, trolley 9 (which is now on the trolley section 17), car circuit and thence to the rail 13.

If the motorman does not desire to throw the switch point he shuts off the controller as he passes on to the dead section 4 and runs over this short section without power. In this case there is no circuit completed through the magnet 7 and when he passes the section 4 and enters on the trolley section 17 the switch point is automatically locked in position. In this case the current flows through the wire 5 down to the post 18, thence to the contact 19, and from the contact 19 through wire 20 to the electro-magnet 16. It then flows from the magnet 16 through the wire 21 to the section insulator 17 extending between points a and b, thus feeding this trolley section. This prevents jarring over of the switch point, and as soon as the operator has passed over the section 4 and entered the section 17, the current will lock the switch point and hold it locked until the car has entirely passed the switch. In case he wishes to throw the switch point, he leaves the controller on and the electric switch member 14 is thrown over while he is on the section 4, thereby shifting the current from one to the other of the electro-magnets 15 and 16 when the trolley wheel 9 reaches the trolley wire section 17, whereupon the switch point is thrown; locking of the electric switch point then takes place the same as above while the trolley remains on the section 17. The section 17 is of such length, that the car will be entirely past the switch before the trolley leaves this section. After passing the section 17 the switch point and the system are left free to be operated by the next car in any direction desired.

The shifting or reversing device by which the electric switch member 14 is actuated

consists in the form shown of a peculiar mechanical movement by which the electric connections to the magnets 15 and 16 are changed so that the current is shifted from one magnet to the other whenever the armature 22 of magnet 7 is drawn upwardly. This armature is connected at its lower end by pivotal link 23 with a triangular pivot lifter 24 having at opposite sides projecting hooks or catches 25. These hooks 25 coact with the upper hooked shape portions 26 of two hooked bars 27 pivotally connected at their lower ends to the switch 14 at opposite sides of its pivot. The upper ends 26 of the hooked bars are provided with laterally projecting rollers which ride over the curved surfaces of loosely pivoted latches 28. These latches are pivoted within slots in the plate 29 and are normally held in the position shown, by spiral springs surrounding their pivots and exerting a spring pressure upon them. Upon the plate 29 is a contact 19′ similar to the contact 19 and having a wire 20′ leading to the solenoid 15. From this solenoid the wire 21′ leads to the wire 21.

The specific construction and mounting of the member 24 is fully shown and described in our prior patent Number 770,456, to which reference is had for a complete understanding of the manner of operation of this element.

The armatures 30 of magnets 15 and 16 are pivotally connected to the opposite pawls of a two-armed switch 31 having at opposite ends metal plates 32 with knives 33 arranged to alternately engage with the contact points 34 and 34′. The pivotal connection between the armature and the switch is shown in Fig. 2, the armature having a forked end with a pivot bolt 35 extending through an insulating bushing, and the plate 32 being insulated from the lever by the insulating layer 36. The lever 31 is centrally pivoted and the one side is connected to the pivotal link 37 which leads to the switch mechanism. In the form shown a bell crank lever 38 has one arm connected to the link 37, the other arm being pivotally connected with the link 39 leading to the switch, but the connection between the lever 31 and the switch may be arranged in any desirable manner. The part 31 serves two functions. In its lever function it actuates the switch point; and in its electrical function it serves to actuate the signal mechanism which indicates the position of the switch.

The signal mechanism in the form shown consists of semaphore arms 40 and 40′ which are pivoted at 41 and 41′ respectively and provided with lever arms carrying colored globes or glasses 42 and 42′.

From the contact point 34 the wire 43 leads through an electric lamp 44 thence through a solenoid 45 and to the wire 46 leading to the rail. Similarly from the point 34′ the wire 43′ leads through the lamp 44′ thence through the solenoid 45′ and to the wire 46. The solenoids are preferably pivoted and their armatures are connected to the semaphore arms by links 47 and 47′ respectively. When the switch 31 is in the position shown the solenoid 45′ is energized and draws down the semaphore arm at the same time bringing the colored globe over the lamp which is now energized and gives a light. When the switch 31 is shifted the arm 40′ is released and will be lifted by the weight of the globe end of the lever, at the same time the magnet 45 is energized and is drawn down thus indicating the shifting of the switch.

In order that the lights or semaphore arms shall indicate the position of the switch in case it is accidentally moved either by a carriage or a mischievous boy, we provide a system of connections which will shift the indicators so that they will always show the position of the switch even if it is operated without energizing the magnets. For this purpose the wires 48 and 48′ connect the contacts 19 and 19′ respectively with the insulated plates 32 upon the lever 31. With these additional connections, if the switch is accidentally moved a certain distance, the lever 31 will be shifted out of contact with the contact points 34 and 34′. In this case both of the magnets 45 and 45′ will be deënergized and the semaphore arms or lights will take a position under gravity showing that the switch is between its normal positions. If the switch is accidentally moved to the other position the knife at the other end of the lever 31 will engage the other contact and shift the signals so that the proper signal will again show for this position of the switch. The signals above described are shown as in shunt with the magnets; they may however be placed in series, one with each magnet.

To provide another signal which shall show the position of the automatic reversing device in case of accidental throwing of the switch, we provide the two-armed signal lever 49 having colored glasses at each end and connected to the lever 14 by chains 50. The ends of the lever 49 swing over the outer lamps 51 and show different colored lights for different positions of the reversing device. If all points are normal the light of signal 49 and the switch point semaphores will be alike.

The advantages of our invention will be obvious to those skilled in the art. In the normal action of the device the operator on a car approaching the switch can determine from the visual signal whether the switch is in the desired position or not. If not he retains the controller in the on-position and the current energizing the magnet 7 as he enters the dead section 4 will shift the switch just before the car reaches it. In either case

whether he actuates the switch or not, the current passing through one of the magnets 15 and 16 will lock the switch in its position until after the car has passed it, the trolley then traveling on the section 17. After passing this section 17 the switch is unlocked and is ready for the next car. Each time that the solenoid 7 is actuated the rail switch will be shifted. If the operator shifts the switch the car will receive the current throughout the dead section and in any case will receive current after passing the section 4. The signals show for either day or night work, the position of the rail switch, whether in either extreme position or accidentally left between these positions; and the indication will be correct even though the switch be accidentally moved. The locking of the switch is an important feature since it prevents tilting over of the switch point and resulting accidents, and this locking is automatically effected.

Many variations may be made in the form and arrangement of the electric connections, the connecting mechanism, the visual signals, etc., without departing from our invention.

We claim:—

1. In an electric switching apparatus, a track having a switch and switch shifting mechanism and a trolley wire having two insulated sections, one of said sections having electrical connections arranged to actuate the switch shifting mechanism and the other section having electric connections arranged to control the action of the first-named section; substantially as described.

2. In an electric switching mechanism a trolley wire having an insulated feed section, a car having a traveling contact therefor, electric switch-point throwing means, a magnet receiving current through the insulated section, means controlled by said magnet for reversing the action of the switch-point throwing means, means for indicating the position of the switch and hand mechanism for controlling the energizing of the magnet; substantially as described.

3. In an electric switching device a switching mechanism having two electro-magnets arranged to throw the switch, means for indicating the position of the switch, an insulated section for the traveling contact and a current-changing device connected with the electric switch for the two magnets and arranged to change the current thereto when the changing device is actuated; substantially as described.

4. A switch having electro-mechanical means for operating it from a car and having signal mechanism arranged to indicate the position of the switch and electrical connections arranged to shift the signal device when the switch is shifted; substantially as described.

5. In switching mechanism, a pair of independent signals, each arranged to indicate a position of the switch and including an electric lamp and a semaphore arm, an electro-magnetic mechanism for shifting each semaphore when the switch is shifted and energize the respective lamps according to the position into which the switch is shifted, substantially as described.

6. In switching apparatus an insulated section for a traveling contact having electrical connections arranged to shift the switch, a set of signals, and separate electro-magnetic means for shifting each of the signals when the switch is shifted; substantially as described.

7. In electric switching mechanism an electro-magnet, an electro-mechanical current-changing device and a current-changing switch arranged to be shifted thereby whenever the magnet is energized, and means controlled indirectly by the current-changing switch for indicating the position of the track switch; substantially as described.

8. In electric switching apparatus an electro-magnetic device arranged to throw the switch, means for indicating the position of the switch, a current-changing electric switch for the electro-magnetic device and an electro-magnet arranged to actuate the electric switch, when it is energized; substantially as described.

9. In electric switching mechanism an insulated section, an electro-magnet connected to said section, a current-changing electric switch arranged to be changed when the magnet is energized, an electric switch actuating device controlled by the electric switch, and means for indicating the position of the switch; substantially as described.

10. In switching apparatus an electro magnetic apparatus for throwing the switch, means for indicating the position of the switch and means for supplying the current to energize said apparatus and lock the switch while the car is passing; substantially as described.

11. In switching apparatus an insulated feed section, electro-magnetic mechanism arranged to shift the switch, switch-signals having electric connections arranged to shift them when the switch is shifted, and means for shifting said signals when the switch is accidentally shifted; substantially as described.

12. In switching apparatus a pair of electrically operated switching signals arranged to show the position of the switch and means for shifting said signals to an off position to indicate intermediate positions of the switch; substantially as described.

13. In switching mechanism a pair of signals, electric connection arranged to shift the signals to show the positions of the switch, and connections arranged to throw the signals to the off positions for interme-

diate positions of the switch; substantially as described.

14. The combination of a switch and electro-mechanical signal mechanism arranged to indicate the position of the switch, said mechanism comprising a trolley wire having an insulated feed section, a car having a traveling contact therefor, a magnet receiving current through the insulated section and having a reversing device arranged to shift the circuits of the signal mechanism, and means for controlling the energizing of the magnet; substantially as described.

15. The combination of a switch and electro-magnetic signal mechanism arranged to indicate the position of the switch, said mechanism comprising a trolley wire having two insulated sections, one of said sections connected to a circuit which contains a reversing switch and a magnet controlling the circuits of the signal mechanism, and the other section connected to a circuit which contains a magnet arranged to actuate said reversing switch.

In testimony whereof, we have hereunto set our hands.

JAMES A. DUFFY.
OSCAR IRWIN.

Witnesses:
C. D. ARMSTRONG,
M. FITZSIMMONS.