Sept. 27, 1932. F. W. HEHRE 1,879,227

APPARATUS FOR TOY ELECTRIC RAILWAYS

Filed Sept. 25, 1929

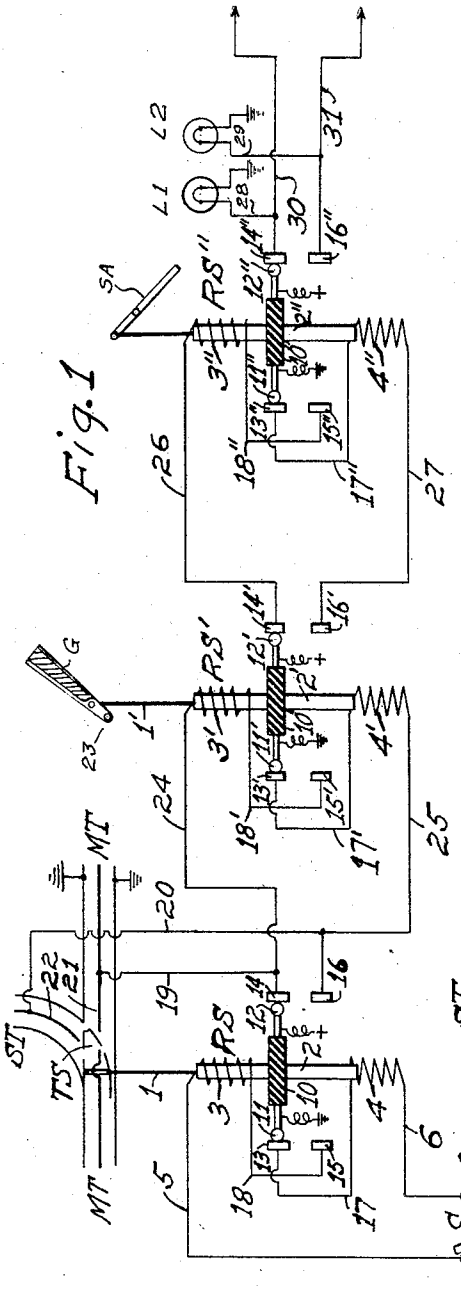

Fig. 1

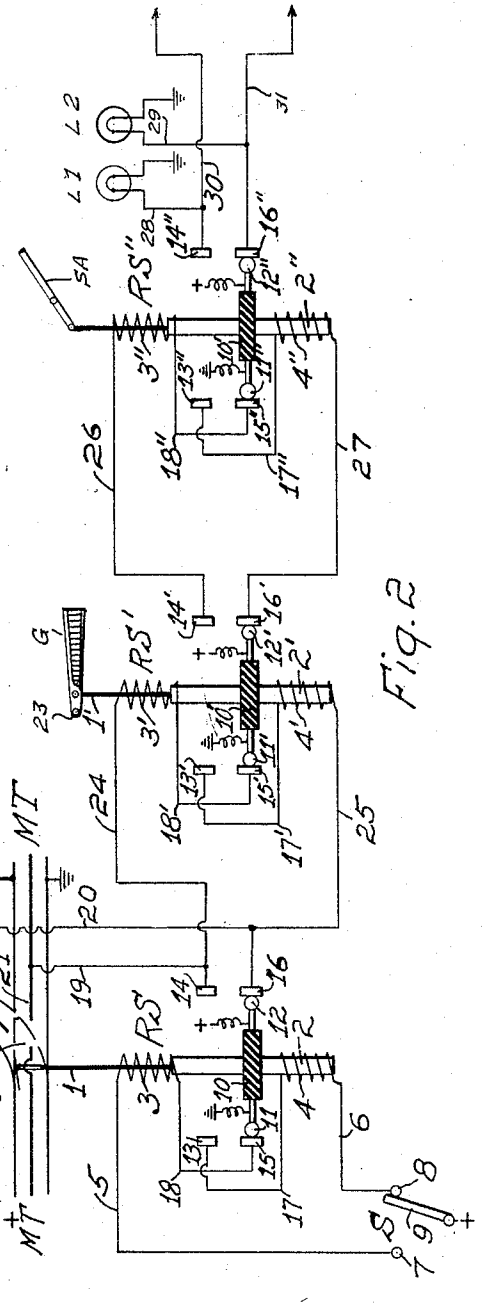

Fig. 2

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Patented Sept. 27, 1932 1,879,227

UNITED STATES PATENT OFFICE

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APPARATUS FOR TOY ELECTRIC RAILWAYS

Application filed September 25, 1929. Serial No. 395,017.

This invention relates to means for operating a group of changeable elements of toy electric railways, such as a group of track switches, semaphores, gates and signal lamps, and has for its principal object the provision of means whereby the actuation of one of said elements automatically results in the actuation of one or more other elements of the group whose position, condition or indication should be coordinated. Another object of the invention is to cause actuation of all of said elements without increasing the power required above that for actuating one of the elements at a time.

To accomplish these and other objects, I provide that the changeable elements shall operate in succession automatically, and preferably in such manner that as each element is operated the energy therefor is automatically interrupted before the next element starts to take energy.

The invention also comprehends apparatus for toy electric railways useful in these and other arrangements.

In the accompanying drawing illustrating the preferred embodiment of the invention, in application, as an example to various forms of changeable elements operated by three reversible solenoids supplied from a grounded direct or alternating current source which also supplies the propulsion current,

Fig. 1 shows the changeable elements in one position of rest, and Fig. 2 in the opposite position.

The toy electric railway has a main track MT and a shunt track ST connected by a track switch TS which is operated by the rod 1 attached to the plunger member 2 of the double-throw or reversible solenoid RS. The outer ends of the energizing coils 3 and 4 thereof are connected by wires 5 and 6 to the opposite contacts 7 and 8 of a manually-operated single-pole double-throw switch S, the blade 9 of which is connected to one terminal (+) of the direct or alternating source of current supply, which in this case is a source of propulsion current also. The solenoid RS is associated with a switch or current distributor comprising the insulating bridge 10 and the rollers 11 and 12, forming movable contacts, the former one engaging the stationary contact 13 at the time the latter one engages the stationary contact 14, as shown in Fig. 1, and the former engaging the contact 15 at the time the latter one engages the contact 16, as shown in Fig. 2. The roller 11 is grounded as shown and the roller 12 is connected to terminal (+) of the source of current supply. The contacts 13 and 15 are connected by wires 17 and 18 to the inner ends of the two energizing coils 3 and 4, whereas the contacts 14 and 16 are connected by wires 19 and 20 to the insulated third rail sections 21 and 22 of the main and shunt tracks, similar to the arrangement described and claimed in my copending application, Serial No. 366,690, filed May 28, 1929.

The second reversible solenoid RS′ is similar to the first except that in this case its plunger member 2′ is connected to the gate G pivoted at 23, whereas the outer ends of its energizing coils 3′ and 4′ are connected by wires 24 and 25 to contacts 14 and 16 of the first solenoid RS instead of to the contacts of the manual switch MS. The third solenoid RS″ is similar to the second one except that the outer ends of its energizing coils 3″ and 4″ are connected by wires 26 and 27 to contacts 14′ and 16′ of the second solenoid RS′ instead of to the contacts 14 and 16 of the first solenoid RS, and inasmuch as this third solenoid controls the pivoted semaphore arm SA and the signal lamps L1 and L2, the contacts 14″ and 16″ are connected by wires 28 and 29 to the grounded filaments thereof as shown. The wires 30 and 31 may be connected, as indicated by the terminating arrows thereof, to a fourth solenoid, and this arrangement may be extended to as many solenoids as desired. As appears later, each of these solenoids automatically interrupts its energizing current during its throw from one position to the other, similar to the solenoid of my copending application Serial No. 395,016 filed September 25, 1929.

In the position shown in Fig. 1, the track switch TS is set for passage of a train through it along the main track MT, the gate G is open, the semaphore arm SA is clear for the main track and the lamp L1, preferably

green-colored indicating safety, is lighted, while the lamp L2, preferably red-colored indicating danger, is out. The manual switch S is closed at contact 7, visually indicating the clear position of the group of changeable elements as aforesaid and also indicating the corresponding position of the solenoids RS, RS′ and RS″. No current is flowing to either energizing coil of any solenoid because the circuit of the respective coils 3, 3′ and 3″, which is closed at contact 7, 14 or 14′, is open at 15, 15′ or 15″, whereas the circuit of respective coils 4, 4′ and 4″, which is closed at contact 13, 13′ or 13″, is open at contact 8, 16 or 16′. Third rail section 21 remains energized from roller 12 by way of contact 14 and wire 19, while third rail section 22 remains deenergized. Likewise lamp 28 remains lighted from roller 12″ by way of contact 14″ and wire 28.

To move the track switch TS to connect the shunt track ST with the main track MT, the blade 9 of switch S is moved to contact 8, whereupon current flows through energizing coil 4 from the terminal (+) of the source by way of 9, 8, 6, 4, 17, 13, 11 and then by ground to the other terminal of the source. The plunger 2 of solenoid RS is then drawn into energizing coil 4. The current to energizing coil 4 is interrupted at contact 13 as soon as roller 11 disengages it, and simultaneously therewith third rail section 22 is deenergized, but the plunger continues its movement into coil 4 by its momentum until the rollers 11 and 12 engage contacts 15 and 16, the final position being shown in Fig. 2, in which third rail section 22 is energized from roller 12 by way of contact 16 and wire 20. As soon as roller 12 engages contact 16, current flows from terminal (+) of the source of current supply, connected to that roller and then by way of 16 and 25 to coil 4′ of solenoid RS′, returning to the grounded terminal of the source through 17′, 13′ and 11′. Plunger 2′ of solenoid RS′ is thereupon drawn into coil 4′, the current thereto continuing to flow until roller 11′ disengages contact 13′. The plunger continues its movement into coil 4′ by its momentum until rollers 11′ and 12′ engage contacts 15′ and 16′, the final position being shown in Fig. 2. As soon as roller 12′ engages contact 16′, current flows from terminal (+) of the source of current supply, also connected to that roller, to energizing coil 4″ by way of 12′, 16′, 27, 4″, 17″, 13″ and 11″ to ground whereupon the plunger 2″ moves into coil 4″. As soon as roller 11″ disengages contact 13″, the current to coil 4″ is interrupted, but the plunger continues its movement by its momentum until rollers 11″ and 12″ engage contacts 15″ and 16″ respectively, the final position being shown in Fig. 2. When roller 12″ disengages contact 14″, lamp L1 is extinguished and when roller 12″ engages contact 16″, lamp L2 is lighted by current flowing from the terminal (+) of the source by way of 12″, 16″, 29 and filament of lamp L2 to ground.

With the group of changeable elements in the position shown in Fig. 2 and blade 9 of the manual switch S engaging contact 8, no current is flowing to either energizing coil of any solenoid, because the circuit of the respective coils 4, 4′ and 4″, which is closed at contact 8, 16 or 16′, is open at contact 13, 13′ or 13″, whereas the circuit of respective coils 3, 3′ or 3″, which is closed at contact 15, 15′ or 15″, is open at contact 7, 14 or 14′. The track switch remains in position to connect the main and shunt tracks, and the third rail section 22 remains energized while the third rail section 21 is deenergized. At the same time the gate is closed, the semaphore arm SA is up and the red lamp L2 is burning to indicate danger.

To move the group of changeable elements to the position shown in Fig. 1, the blade 9 in Fig. 2 is moved to contact 7, whereupon current flows from terminal (+) of the source through coil 3 by way of 9, 7, 5, 3, 18, 15 and 11 to ground. The plunger 2 of solenoid RS is then drawn into coil 3, the current thereto being interrupted as soon as roller 11 disengages contact 15, and the plunger continuing its movement by its momentum until the rollers 11 and 12 engage contacts 13 and 14, the final position shown in Fig. 1. As the roller 12 engages contact 14, current flows from terminal (+) of the source through coil 3′ by way of 14, 24, 3′, 18′, 15′ and 11′ to ground. Plunger 2′ is then drawn into coil 3′, the current thereto being interrupted when roller 11′ disengages contact 15′, and the plunger continuing its movement by its momentum until rollers 11′ and 12′ engage contacts 13′ and 14′ as shown in Fig. 1. As soon as roller 12′ engages contact 14′, current flows from the terminal (+) of the source through coil 3″ by way of 12′, 14′, 26, 3″, 18″, 15″ and 11″ to ground, whereupon the plunger 2″ moves into coil 4″. As soon as roller 11″ disengages contact 15″, the current to coil 3″ is interrupted, but the plunger continues its movement by its momentum until rollers 11″ and 12″ engage contacts 13″ and 14″, respectively, the final position being shown in Fig. 1. When roller 12″ disengages contact 16″, lamp L2 is extinguished and when roller 12″ engages contact 14″, lamp L1 is lighted by current flowing from terminal (+) of the source through its filament to ground by way of 12″, 14″ and 28. All of the changeable elements of the group are now in the position shown in Fig. 1 and are ready for a subsequent movement to their opposite position upon the next manual initiation by movement of the switch S.

Instead of the three solenoids shown herein, two or more than three may be arranged

to operate in succession automatically, and instead of connecting them to the changeable elements shown herein, they may be connected to any other group such as two or more track switches, each with associated semaphore arms and signal lights, or with semaphore arms, signal lights, gates etc., operated by independent solenoids of the same group. Furthermore, the current for operating the solenoids may be supplied from a source different from or independent of the source of propulsion current, or, in fact, the devices for operating the changeable elements may use energy other than electrical energy.

Having described my invention, what I claim is:

1. In a toy electric railway, the combination with a plurality of associated movable track and way elements, of means for operating said elements in succession automatically after initial manual actuation, said means being arranged to operate said elements always in the same sequence at each manual actuation.

2. In a toy electric railway, the combination with a plurality of associated movable track and way elements, of electrical means for operating said elements in succession automatically after initial manual actuation, with automatic current cutoff from said means after operation of said elements, said means being arranged to operate said elements always in the same sequence at each manual operation.

3. In a toy electric railway, the combination with a plurality of associated movable track and way elements, of interconnected separate electrical means for operating said elements in succession automatically after initial manual actuation, with automatic current cut-off from each operating means after actuation of each of said operating means, said means being arranged to operate said elements always in the same sequence at each manual actuation.

4. In a toy electric railway, the combination with a plurality of associated movable track and way elements, of interconnected, separate electrical means for operating said elements in succession automatically after initial manual actuation, with automatic current cut-off from each operating means after actuation of each of said operating means and the imparting of current to a succeeding operating means, said means being arranged to operate said elements always in the same sequence at each manual actuation.

5. In a toy electric railway, a track having an insulated section, a manually controlled electrically actuated device for changing the electrical condition of said section, and a movable signal device set into motion by and after actuation of said first named device.

6. In a toy electric railway, a track having an insulated section, a manually controlled electrically actuated device for changing the electrical condition of said section, and movable signal devices set into motion by and after each actuation of said first named device, the current for actuating said first mentioned device being arranged to be automatically cut off from its actuating means after each actuation of said device.

7. In a toy electric railway, a track having an insulated section, a manually controlled electrically actuated device for changing the electrical condition of said section, and other devices arranged to be electrically actuated by said first mentioned device, the current for actuating each of said devices being arranged to be automatically cut off from their respective actuating means after each actuation of each of said devices.

8. In a toy electric railway, a track having an insulated section, a manually controlled electrically actuated device for changing the electrical condition of said section, and other electrically actuated devices arranged to be set automatically into automatically successive operation by said first mentioned device.

9. In a toy electric railway, a track having an insulated section, a manually controlled electrically actuated device for changing the electrical condition of said section, and other electrically actuated devices arranged to be set automatically into automatically successive operation by said first mentioned device, the current for actuating each of said devices being arranged to be automatically cut off from their respective actuating means after each actuation of each of said devices.

10. In a toy electric railway, a track having a plurality of insulated sections, a manually controlled electrically actuated switch for selectively energizing said sections and one or more movable signal devices set into motion by and after each actuation of said first named device.

11. In a toy electric railway, main and shunt tracks, a track switch, an insulated track section, manually controlled electrical means for operating said track switch and changing the electrical condition of said section and one or more movable signal devices set into motion by and after each actuation of said first mentioned device.

12. In a toy electric railway, a main track having an insulated section, a shunt track having an insulated section, a track switch, manually controlled electrical means for operating said track switch and selectively energizing said insulated sections and one or more movable signal devices set into motion by and after each actuation of said first mentioned device.

13. In a toy electric railway, a main track having an insulated section, a shunt track having an insulated section, a track switch, manually controlled electrical means for operating said track switch and selectively en-

ergizing said insulated sections, the current for actuating the switch being arranged to be automatically cut off after each actuation thereof and one or more movable signal devices set into motion by said means after said switch has been actuated.

14. In a toy electric railway, a main track having an insulated section, a shunt track having an insulated section, a track switch, manually controlled electrical means for operating said track switch and selectively energizing said insulated sections, and other interconnected devices controlled by the track switch operating mechanism.

15. In a toy electric railway, a main track having an insulated section, a shunt track having an insulated section, a track switch, manually controlled electrical means for operating said track switch and selectively energizing said insulated sections, and other interconnected devices having automatically successive operation after initial actuation by the track switch operating mechanism.

16. In a toy electric railway, a main track having an insulated section, a shunt track having an insulated section, a track switch, a manually controlled electrically actuated device for operating said track switch and selectively energizing said insulated sections, and other devices arranged to be electrically actuated by said first mentioned device, the current for actuating each of said devices being arranged to be automatically cut off from their respective actuating means after each actuation of each of said devices.

17. In a toy electric railway, a main track having an insulated section, a shunt track having an insulated section, a track switch, a manually controlled electrically actuated device for operating said track and selectively energizing said insulated sections, and other electrically actuated devices arranged to be set automatically into automatically successive operation by said first mentioned device, the current for actuating each of said devices being arranged to be automatically cut off from their respective actuating means after each actuation of each of said devices.

In testimony whereof I affix my signature.

FREDERICK W. HEHRE.