May 26, 1953 M. R. HALL 2,639,548

TOY RAILWAY AUXILIARY

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Fig. 1.

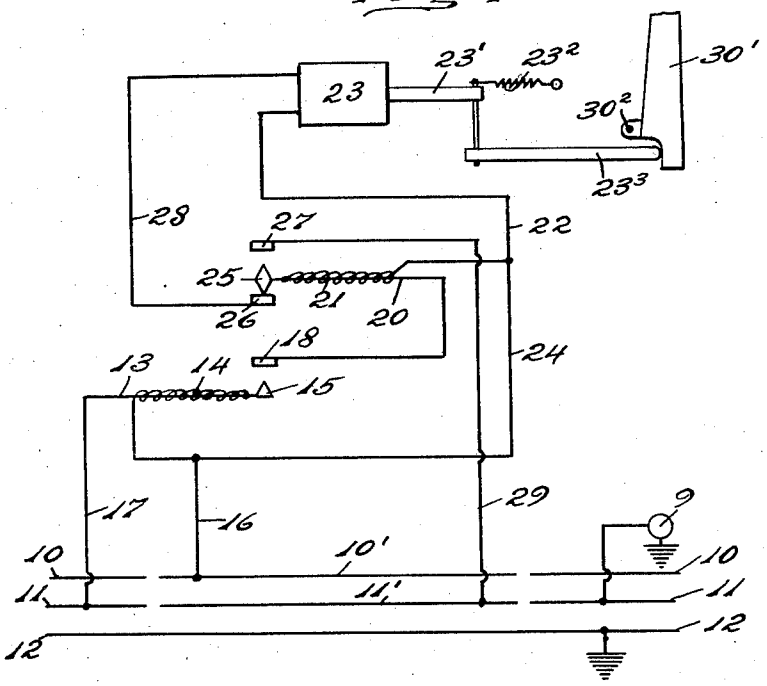
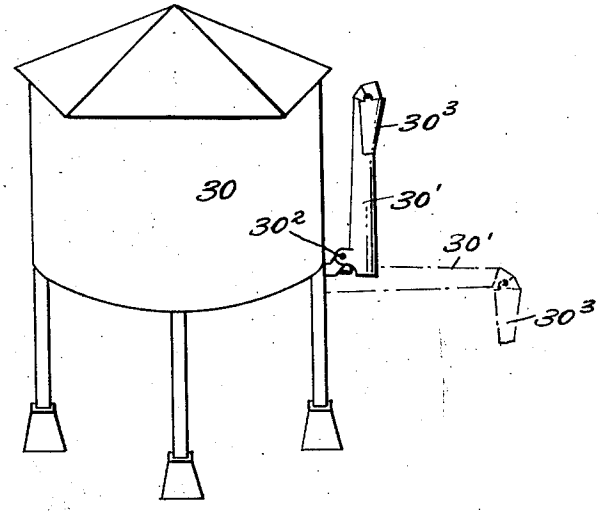


Fig. 2.



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Fig. 3.

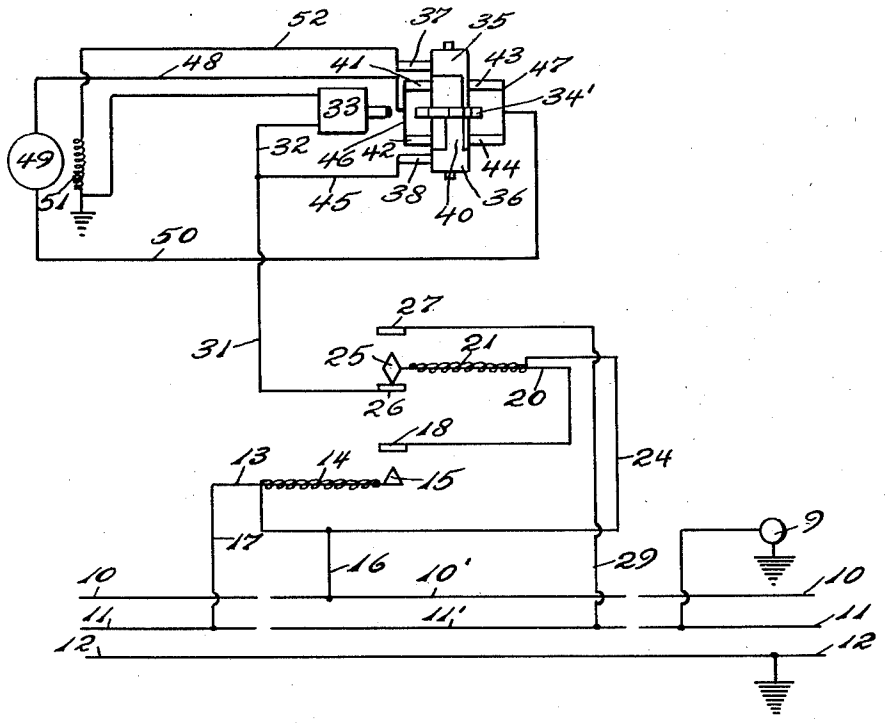


Fig. 4.

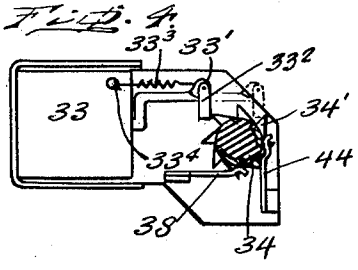


Fig. 5.

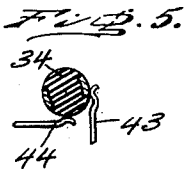
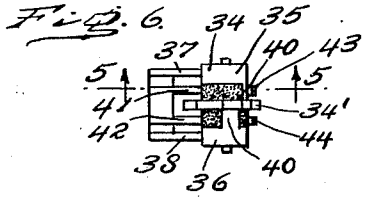


Fig. 6.



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Fig. 7.

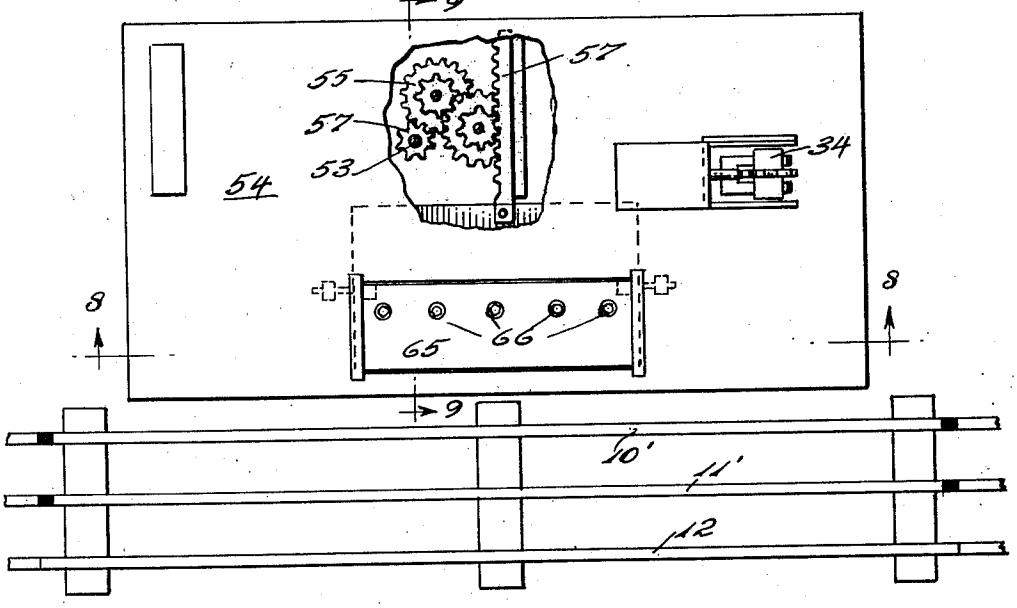


Fig. 8.

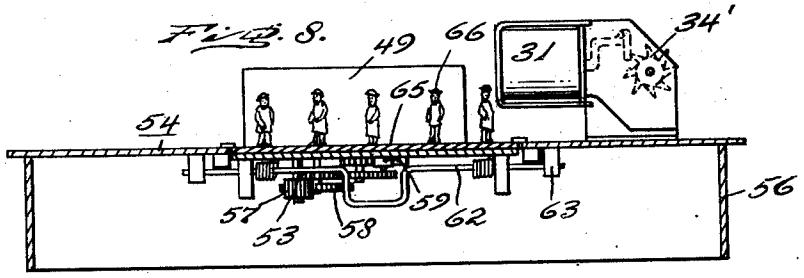


Fig. 9.

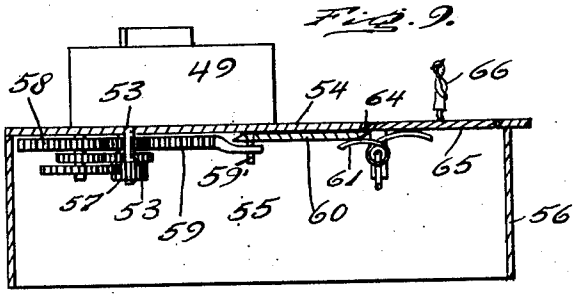


Fig. 10.

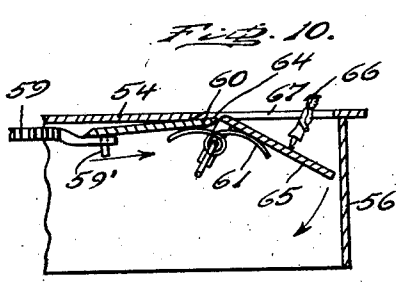
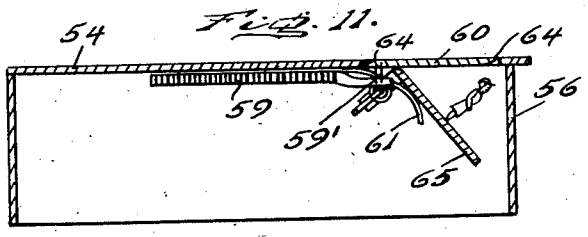


Fig. 11.



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TOY RAILWAY AUXILIARY

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Application November 28, 1951, Serial No. 258,631

6 Claims. (Cl. 46—216)

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The present invention relates to toy railway auxiliaries, and particularly to the energizing of station equipment automatically in connection with a toy railroad.

The purpose of the invention is to bring a toy railway train to a stop at a station automatically, automatically perform an operation at the station such as watering the locomotive or moving passengers on or off the platform, and then automatically restart the train while placing the station mechanism in condition to operate upon the next arrival of a train.

A further purpose is to stop a toy railway train on insulated rail sections, start a first timer by the arrival of the train, start a second timer when the first timer times out, operate a railway auxiliary when a second timer starts, and restart the train when the second timer times out.

A further purpose is to perform alternate operations at a station automatically on successive arrivals of a train by advancing a reversing switch step-by-step in response to the train arrival.

A further purpose is to advance a reversing switch to the next position when a timer times out after arrival of a toy railway train at a station, so that the user will have the pleasure of observing different station operating routines on arrival of successive trains.

Further purposes appear in the specification and the claims.

In the drawings I have chosen to illustrate a few only of the numerous embodiments in which my invention may appear, selecting the forms shown from the standpoints of convenience in illustration, satisfactory operation and clear demonstration of the principles involved.

Figure 1 is a circuit diagram illustrating one embodiment of the invention, as applied to the watering of a train.

Figure 2 is a perspective view showing the watering tower.

Figure 3 is a circuit diagram of a different embodiment of the invention, shown applied to the manipulation of representations of people on a station platform.

Figure 4 is an end elevation partly in transverse section showing the solenoid and rotary reversing switch.

Figure 5 is a fragmentary section of the rotary reversing switch, the section being on the line 5—5 of Figure 6.

Figure 6 is a top plan view of the rotary reversing switch of the invention, illustrating contacts more clearly than in the diagrammatic view of Figure 3.

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Figure 7 is a top plan view of a station employed in the embodiment of Figures 3 to 6, partially broken away to show the operating mechanism.

Figure 8 is a section of Figure 7 on the line 8—8.

Figure 9 is a section of Figure 7 on the line 9—9, showing the insert in position providing representations of people on the platform.

Figure 10 is a fragmentary view similar to Figure 9 showing the blank insert entering the platform and the insert carrying the representations of people leaving the platform.

Figure 11 is a view corresponding to view 9 showing the blank insert fully in place and the insert carrying the representations of people depressed.

In the drawings like numerals refer to like parts.

The invention is concerned with the operation of auxiliary equipment in connection with a toy railroad, and particularly with the automatic operation of equipment located at a station in conjunction with the automatic starting and stopping of the toy railway train at the station. The invention is applicable particularly to equipment normally employed at railway stations and to operations encountered there, such as loading, unloading, watering, movement of people on the platform, and the like.

In accordance with the invention, the train is brought to a stop automatically at the station, it stops at the station for a predetermined time and then leaves the station. While the train is at the station an operation is performed, energized by the train arrival.

In the preferred embodiment, a sequence of electrical timers is employed, one of which determines the interval during which the train remains at the station before the operation at the station is energized, and another of which determines the interval that the train remains at the station after the auxiliary equipment at the station is energized and before the train leaves. When the train arrives at the station, the third rail causes the train to stop because of the presence of an insulated rail section. The presence of the train, nevertheless, starts a first timer normally due to electrical connection through the wheels, and when the first timer times out it energizes a solenoid or the like which brings about operation of equipment at the station. Also when the first timer times out it starts a second timer. When the second timer times out it energizes the insulated section of the

third rail, causing the train to move forward again.

In some cases, it is desirable to have different operations performed on successive cycles. This can be conveniently accomplished by manipulating the auxiliary equipment through a reversing motor and advancing a switch one stop at a time whenever the first timer times out. Thus on one occasion when the train arrives at the platform representations of people appear on the platform, apparently having alighted from the train. On the next arrival of a train at the platform, the representations of people disappear, apparently having gotten aboard the new train. As the operation is not dependent on any peculiarity of a particular train, it will be seen that several trains operating on the same track can produce the effect.

Considering first the form of Figures 1 and 2, which illustrates a water tower which is manipulated automatically, when the train moves to a position corresponding to the station position, the train stops, the water spout is lowered and later retracted, and after a predetermined time the train moves forward again. The station equipment is then left in condition to perform the operation again each time a train arrives.

The railroad track consists of rails 10, 11 and 12. Rail 10 is normally deenergized and may be normally connected to rail 12. However, in this instance at the station location rail 10 is provided with an insulated section 10'. Rail 11 is the normally energized rail or third rail which receives electrical current, suitably alternating current at a conventional toy railway voltage and frequency from generator 9, the opposite side of which is grounded. At the station and suitably opposite insulated rail section 10', the third rail is provided with insulated rail section 11'. Rail 12 is grounded.

The timers employed are preferably of the bi-metallic thermostatic metal type having heater coils. Timer 13 is a bi-metal strip having a heater coil 14 which is suitably insulated from but in heat transfer relation to the bi-metal strip, and may conveniently be wound around the bi-metal strip. At the free end the bi-metal strip is provided with a movable contact 15. The heater coil is electrically connected as by soldering to the bi-metal strip adjacent contact 15.

Insulated rail section 10' of the normally deenergized rail 10 is connected to the end of the heater coil remote from the bi-metal strip by lead 16. Energized rail 11 is connected to the bi-metal strip suitably at the fixed end by lead 17.

When the thermostatic timer 13 expands sufficiently to "time out," contact 15 engages contact 18 which electrically connects with the bi-metal thermostatic element 20 of a second timer, suitably from the fixed end. At the free end the thermostatic element 20 of the second timer is connected as by soldering to one end of heater coil 21, which is electrically insulated from but in heat transfer relation to the bi-metal element 20 and suitably surrounds element 20. The heater coil 21 at the end remote from the connection to bi-metal element 20 is connected by lead 22 to one end of solenoid 23 which operates the water tower as later explained.

Lead 24 connects lead 16 to solenoid 23 at the same side as that to which heater coil 21 is connected. Contact 25 at the free end of the second thermostatic timer is normally in contact with a fixed contact 26, but when it times out, it makes contact with another fixed contact 27. Contact 26 is connected by lead 28 to the opposite side of solenoid 23. Contact 27 is connected by lead 29 to insulated rail section 11' of energized rail 11.

The bi-metal thermostatic elements are preferably of the snap type which remain in one limiting position until they are ready to snap to the opposite limiting position so that the new position is achieved almost instantaneously.

Water tower 30 as shown in Figure 2 has a spout 30' pivoted on horizontal pivot 30^2 and suitably provided with a pivoted extension 30^3 to simulate the drop spout. Solenoid 23 is spring urged toward the position to elevate the spout as shown in full lines in Figures 1 and 2, as by tension spring 23^2 pulling the armature out. The armature 23' has an offset portion 23^3 which engages the spout beyond the pivot 30^2, thus holding the spout in the elevated position, except where the solenoid is energized, in which case the spout drops by gravity to the position shown in dot-and-dash lines in Figure 2.

In operation, when the train moves on the track in either direction and reaches insulated rail sections 10' and 11', the interruption in power due to the insulation of third rail section 11' causes the driving motor to stop. This stops the train with the locomotive in position on the insulated rail sections 11' and 10', which should be long enough to allow for the inertia of the train in stopping. The wheels of the locomotive or cars on the insulated section including the axles or other metallic parts electrically connect rail 12 to insulated rail section 10'. Therefore an electric circuit is completed from third rail 11, lead 17, bi-metallic thermostatic timer element 13, heater element 14, lead 16, insulated rail section 10', the wheels of the locomotive, and rail 12 to ground. This causes heater element 14 to heat bi-metallic element 13, causing the first timer to start. Actually the first timer starts while the train is stopping. After the desired interval depending upon the predetermined time interval of the first timer, the first timer times out, the bi-metallic element preferably snapping to bring movable contact 15 into engagement with fixed contact 18.

A circuit is now completed through the second timer. This circuit extends from the third rail 11, through lead 17, bi-metallic thermostatic element 13, movable contact 15, fixed contact 18, bi-metallic thermostatic element 20 of the second timer, heater coil 21 of the second timer, lead 24, lead 16, insulated rail section 10', the wheels and other metallic parts of the locomotive, to rail 12, and then to ground. During this interval heater elements 14 of the first timer and 21 of the second timer both heat in parallel, so that the first timer remains in the timed out position.

At the moment the second timer begins to time, a circuit is completed from third rail 11, a lead 17, thermostatic element 13 of the first timer, contacts 15 and 18, thermostatic element 20 of the second timer, movable contact 25, fixed contact 26, lead 28, solenoid 23, lead 22, lead 24, lead 16, insulated rail section 10', the wheels and other metallic parts of the locomotive, and track 12 to ground, energizing the solenoid 23, and allowing spout 30' to drop into position for watering the locomotive.

In the meantime bi-metallic element 20 of the second timer heats and evidently snaps, to time out, bringing movable contact 25 into engagement with fixed contact 27. This breaks the elec-

tric circuit through solenoid 23, deenergizing the solenoid and allowing spring 23^2 to raise the watering spout 30'. Electric current now flows to insulated rail section 11'. The circuit is completed from third rail 11, to lead 17, bi-metallic thermostatic element 13, contacts 15 and 18, bi-metallic thermostatic element 20, contacts 25 and 27 and lead 29. This starts the driving motor of the locomotive, and the train moves forward past the station.

As soon as the wheels leave the insulated rail sections, current ceases to flow through the heater coils of the electric timers and the thermostatic elements cool and snap back to starting position. The device is then quickly ready for operation at the arrival of the next train coming in either direction.

In the form of Figures 1 and 2, the operation is directly repetitive. In some cases, it is desirable to vary the operation and this can readily be accomplished using the mechanism of Figures 3 to 11 inclusive.

The timer in the form of Figures 3 to 11 is suitably identical with that of Figures 1 and 2, and it will merely be necessary to describe those features which are different.

Fixed contact 26 of the second timer connects through leads 31 and 32 to solenoid 33, which in this case operates a reversing switch. The opposite side of the solenoid is grounded. The armature 33' of solenoid 33 engages ratchet teeth 34' on a rotary drum type reversing switch 34 which is pivoted at the ends in any suitable bearings not shown. The armature 33' has a pivoted latch 33^2 which engages the ratchet teeth on the forward stroke, and swings out of the way on retraction. The drum 34 is suitably of insulation with contacts at the surface. At the opposite ends of the drum are located endless annular contact rings 35 and 36. Contact ring 35 is engaged suitably at the bottom by brush 37 and contact ring 36 is engaged at the same angular position by brush 38. Each of contact rings 35 and 36 carries at 180° spaced positions circumferentially located contact extensions 40 parallel to the axis which may be extended inwardly as far as the ratchet teeth. The contact extensions 40 from contact ring 35 are displaced 90° from those on contact ring 36.

Located inwardly of contact rings 35 and 36 and in line with contact extensions 40 are spaced contact brushes 41 and 42 which engage the circumference of the drum at the same position as contact brushes 37 and 38. Also spaced inwardly of contact rings 35 and 36 and in line with contact extensions 40 are placed spaced contact brushes 43 and 44 located 90° around the circumference from contact brushes 41 and 42 as best seen in Figures 4 and 5. In Figure 3 these later brushes are angularly moved from their true position so that they can be seen.

Lead 31 connects by lead 45 to brush 38. Brushes 41 and 42 cross connect by lead 46. Brushes 43 and 44 cross connect by lead 47. Cross connection 46 is connected to one side of the armature 49 of an auxiliary driving motor by lead 48, and cross connection 47 is connected to the opposite side of armature 49 by lead 50. Brush 37 is connected to the field 51 of the auxiliary driving motor by lead 52, and the opposite side of the field is grounded.

The auxiliary driving motor is suitably an alternating current reversing motor having a driving shaft 53 best seen in Figures 7 and 9, which extends down through station platform 54 into a

gear case 55 having side walls 56. The shaft 53 carries gear 57 at its lower end. Gear 57 interconnects through a speed reduction train 58 with rack 59 which is slidably mounted and pivotally connects at 59' with blank platform insert 60. Insert 60 is held against the bottom of the platform when in retracted position by torque springs 61 which are supported on pivot 62 mounted on bearings 63 on the platform. The blank insert 60 has wedge forward and rearward ends 64, and as the blank insert is pushed forward it engages insert 65 at a position above its pivotal mounting on pivot 62, rocking insert 65 down against the action of the opposite ends of torque springs 61. Insert 65, has figures 66 suitably indicating people on the platform. As the rack moves forward, blank insert 60 is moved toward the right in Figure 9 and is moved up by torque spring 61 moving platform insert 65 down until platform insert 60 engages in space 67, filling the space and producing an unoccupied condition of the platform as shown in Figure 11. When the rack is moved in the reverse direction it withdraws insert 60 to the position of Figure 9, and allows insert 65 to return to elevated position as shown in Figure 9.

In operation, when the locomotive reaches the insulated section of the track, the locomotive driving motor is deenergized due to the interruption of the third rail, while the wheels and other metallic parts of the locomotive cross connect from their insulated rail section 10' to grounded rail section 12. The first timer is then energized as already explained, through lead 17, bi-metallic element 13, heater element 14, lead 16, the locomotive wheels and other metallic parts, and rail 12 to ground.

When bi-metallic element 13 heats up and snaps into timing out position, movable contact 15 closes against contact 18 and the second timer starts, being energized from the third rail 11, lead 17, bi-metallic element 13, contacts 15 and 18, bi-metallic element 20, heater element 21, lead 24, lead 16, insulated rail section 10', the wheels and other metallic parts of the locomotive, and rail 12 to ground.

At the same time that the second timer starts, current passes from contacts 25 and 26 to leads 31 and 32, and solenoid 33 to ground. The solenoid advances against the action of tension spring 33^3, acting from spring abutment 33^4, turning ratchet 34' of the drum reversing switch forward 90°. It will be evident, of course, that by adjusting the distance of solenoid advance, the ratchet can be made so that it will shift the auxiliary devices such as the people on the platform once in every second, third, or fourth times that the train stops.

When the drum reversing switch advances, energy passes through lead 45, brush 38, contact ring 36, brush 42, cross connection 46, lead 48, armature 49, lead 50, cross connection 47, brush 43, contact extension 40 of contact ring 35, contact ring 35, brush 37, and field 51 to ground. This operates the auxiliary motor in the direction to withdraw the blank insert 60 and raise the people on the platform, or accomplish any similar movement.

When the heating unit of the second timer causes bi-metallic element 20 to snap across and bring movable contact 25 into engagement with fixed contact 27, the auxiliary motor is deenergized, and the circuit is completed to pass electric current from rail 11 through lead 17, bi-metallic element 13, contacts 15 and 18, bi-me-

tallic element 20, contacts 25 and 27 and lead 29 to insulated rail section 11'. This causes the train to move forward.

The next time a train arrives at the station, the same operation is repeated except that the drum of the reversing switch advances far enough to reverse the circuit connections (or toward the position of reversal where several train stops are required to complete reversal). Lead 45 now connects to brush 38 to contact ring 36, to contact ring extension 40, to brush 44, to cross connection 47, to lead 50, to the motor armature causing it to reverse, to lead 48, to cross connection 46, to brush 41, to contact extension 40, to contact ring 35, to brush 37, to lead 52, to field 51 and then to ground.

Thus on successive arrivals of the train at the station, people disappear and reappear on the platform.

It will be evident that the principles of the invention may be applied to the operation of any suitable mechanism, especially solenoid and motor operated auxiliary equipment at the particular station locations.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention without copying the structure shown, and I therefore claim all such insofar as they fall within the reasonable spirit and scope of my claims.

Having thus described my invention what I claims as new and desire to secure by Letters Patent is:

1. In a toy railway auxiliary, a normally energized railway rail having an insulated portion, a normally deenergized railway rail having an insulated portion, a normally grounded railway rail extending past the insulated portions, a first electrical timer electrically connected from the normally energized rail to the insulated portion of the normally deenergized rail whereby it will be energized through the wheels of the train when they connect from the insulated portion of the normally deenergized rail to the grounded rail, a second electrical timer operatively connected by the first electrical timer after the first electrical timer times out between the normal energized rail and the insulated portion of the normally deenergized rail, electrical connections from the second electrical timer after the second timer times out to the insulated portion of the normally energized rail for re-starting the train and an auxiliary electrical device operatively connected to the second timer when it begins to time and connected across between the energized rail and the insulated portion of the deenergized rail.

2. In a toy railway auxiliary, a normally energized railway rail having an insulated portion, a normally deenergized railway rail having an insulated portion, a normally grounded railway rail extending past the insulated portions, a first electrical timer electrically connected from the normally energized rail to the insulated portion of the normally deenergized rail whereby it will be energized through the wheels of the train when they connect from the insulated portion of the normally deenergized rail to the grounded rail, a second electrical timer operatively connected by the first electrical timer after the first electrical timer times out between the normally energized rail and the insulated portion of the normally deenergized rail, electrical connections from the second electrical timer after the second timer times out to the insulated portion of the normally energized rail for restarting the train, an electric solenoid operatively connected to the second timer before the second timer times out and between the energized rail and the insulated portion of the deenergized rail and auxiliary equipment for the toy railroad manipulated by the solenoid.

3. In a toy railway auxiliary, a normally energized railway rail having an insulated portion, a normally deenergized railway rail having an insulated portion, a normally grounded railway rail extending past the insulated portions, a first electrical timer electrically connected from the normally energized rail to the insulated portion of the normally deenergized rail whereby it will be energized through the wheels of the train when they connect from the insulated portion of the normally deenergized rail to the grounded rail, a second electrical timer operatively connected by the first electrical timer after the first electrical timer times out between the normally energized rail and the insulated portion of the normally deenergized rail, electrical connections from the second electrical timer after the second timer times out to the insulated portion of the normally energized rail for restarting the train, a solenoid operatively connected to the second timer after the first timer times out between the energized rail and the insulated portion of the deenergized rail, a rotary reversing switch advancing one step each time the solenoid is energized and operatively connected to the solenoid, an auxiliary electrical motor reversibly connected to the reversing switch and connected between the energized rail and the insulated portion of the deenergized rail after the first timer times out, and auxiliary equipment operatively connected to the auxiliary motor.

4. In a toy railway auxiliary, a normally energized railway rail having an insulated portion, a normally deenergized railway rail having an insulated portion, a normally grounded railway rail extending past the insulated portions, a first electrical timer electrically connected from the normally energized rail to the insulated portion of the normally deenergized rail whereby it will be energized through the wheels of the train when they connect from the insulated portion of the normally deenergized rail to the grounded rail, a second electrical timer operatively connected by the first electrical timer after the first electrical timer times out between the normally energized rail and the insulated portion of the normally deenergized rail, electrical connections from the second electrical timer after the second timer times out to the insulated portion of the normally energized rail for restarting the train, a solenoid operatively connected to the second timer after the first timer times out and connected between the energized rail and the insulated portion of the deenergized rail, a drum reversing switch having a pair of continuous annular contacts, extensions from the respective annular contacts which are respectively 180° apart on each annular contact and 90° apart between respective extensions on different annular contacts, brushes engaging the continuous annular contacts, pairs of brushes respectively 90° displaced intermittently engaging the extensions, electrical connections from the second timer when it begins to time to the brush engaging one of the annular contacts, a ratchet on the drum operatively connected to the solenoid to advance the drum 90° each time the solenoid is energized, a piece of

auxiliary equipment, an auxiliary motor having an armature and a field, the armature being connected between the two pairs of brushes engaging the contact extensions and electrical connections from the field to the brush engaging the other annular contact and to ground.

5. In a toy railway, a station having a platform, selective inserts for the platform one of which is without figures of people and the other of which is provided with figures of people, an electric motor operatively connected to one of the inserts for inserting the insert into the platform and concurrently displacing the other insert from the platform, rails including an energized rail having an insulated section, a deenergized rail having an insulated section and a grounded rail, a plurality of timers, means operatively connected to the rails including the insulated sections for operating the timers in sequence, reversing switch means operatively connected to the motor for driving the same in either direction, and means operatively connected between a timer other than the timer first put in operation and the reversing switch for energizing the reversing switch and driving the motor.

6. In a toy railway, a normally energized rail having an insulated section, a normally deenergized rail having an insulated section opposite the insulated section on the normally energized rail, a grounded rail, a first timer operatively connected between the energized rail and the insulated section of the normally deenergized rail and placed in operation by the cross connection of the wheels between the insulated section of the deenergized rail and the grounded rail, a second timer operatively connected to the first timer after the first timer times out to energize the second timer, a solenoid operatively connected between the second timer and ground when the second timer begins to time, a rotary reversing switch including a ratchet operatively connected to the solenoid, a motor having an armature and a field, the field being operatively connected through the reversing switch from the second timer to ground when the second timer begins to time and the armature being reversibly operatively connected to the second timer when the second timer begins to time, and a connection from the energized rail through the second timer after the second timer times out to the insulated portion of the energized rail for restarting the train.

MELVIN REEVES HALL.

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